National Research Council Canada | Conseil national de recherches Canada

NRC·CNRC

Departmental Performance Report

National Research Council Canada

For the period ending 31 March 2008

Tony Clement
Minister of Industry

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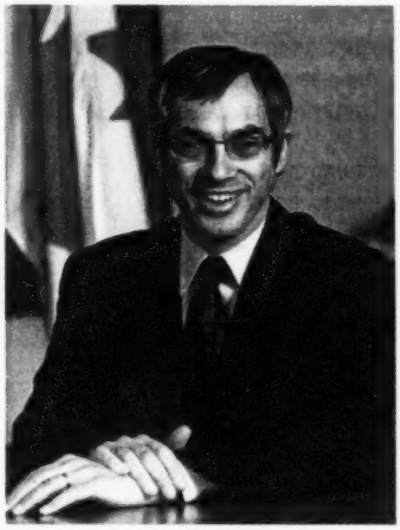
Acronyms and Abbreviations

AIP	Atlantic Investment Partnership
ALMA	Atacama Large Millimeter Array
CBRN	Chemical, Biological, Radiation and Nuclear
cGMP	Current Good Manufacturing Practices
CFHT	Canada-France-Hawaii Telescope
CRTI	CBRN Research and Technology Initiative
CTI	Competitive Technology Intelligence
DND	Department of National Defence
DRDC	Defence Research and Development Canada
FCHP	Fuel Cell and Hydrogen Program
FTE	Full-Time Equivalent
GHI	Genomics and Health Initiative
HRM	Human Resources Management
IP	Intellectual Property
IPF	Industry Partnership Facility
ITA	Industrial Technology Advisor
JCMT	James Clerk Maxwell Telescope
LRP	Long Range Plan for Astronomy and Astrophysics
LTRC	Language Technologies Research Center
MRI	Magnetic Resonance Imaging
MSE	Medium-Sized Enterprise
NIC	NRC Information Centre (NRC-CISTI)
NINT	National Institute for Nanotechnology
NMI	National Metrology Institute
NRC	National Research Council Canada
NRC-AMTC	Aerospace Manufacturing Technology Centre
NRC-ATC	Aluminium Technology Centre
NRC-BRI	Biotechnology Research Institute
NRC-CHC	Canadian Hydraulics Centre
NRC-CISTI	Canada Institute for Scientific and Technical Information
NRC-CPFC	Canadian Photonics Fabrication Centre
NRC-CSIR	Centre for Sustainable Infrastructure Research
NRC-CSTT	Centre for Surface Transportation Technology
NRC-GTL	Gas Turbine Laboratory
NRC-HIA	Herzberg Institute of Astrophysics
NRC-IAR	Institute for Aerospace Research
NRC-IBD	Institute for Biodiagnostics
NRC-IBS	Institute for Biological Sciences
NRC-ICPET	Institute for Chemical Process and Environmental Technology
NRC-IFCI	Institute for Fuel Cell Innovation
NRC-IIT	Institute for Information Technology
NRC-IMB	Institute for Marine Biosciences
NRC-IMI	Industrial Materials Institute
NRC-IMS	Institute for Microstructural Sciences

NRC-INMS	Institute for National Measurement Standards
NRC-INH	Institute for Nutrisciences and Health
NRC-IOT	Institute for Ocean Technology
NRC-IRAP	Industrial Research Assistance Program
NRC-IRC	Institute for Research in Construction
NRC-PBI	Plant Biotechnology Institute
NRC-SIMS	Steacie Institute for Molecular Sciences
NSERC	Natural Sciences and Engineering Research Council of Canada
OAG	Office of the Auditor General of Canada
OECD	Organisation for Economic Co-operation and Development
OTEC	Ocean Technology Enterprise Centre
PEMFC	Proton Exchange Membrane Fuel Cells
PRI	Policy Research Initiative
R&D	Research and Development
S&T	Science and Technology
SMEs	Small- and Medium-sized Enterprises
SOFC	Solid Oxide Fuel Cells
STM	Scientific, Technical and Medical
TBS	Treasury Board of Canada Secretariat
TIS	Technology and Industry Support

Section I – Agency Overview

Minister's Message



The Industry Portfolio experienced a busy and successful 2007–2008. As Minister of Industry, I am pleased with the progress made on our mission to foster a competitive, knowledge-based economy that benefits all Canadians.

A competitive economy is one that provides jobs and opportunity to Canadians, and top-quality products and services to consumers. Our economic performance underpins the quality of life we enjoy in this country, and the National Research Council Canada is making important contributions to this mission.

The Industry Portfolio is composed of Industry Canada and 10 other agencies, Crown corporations and quasi-judicial bodies. These organizations collectively advance Canada's industrial, scientific and economic development, and help ensure that we remain competitive in the global marketplace.

As a country, we must remain focused on how we can continue to provide an innovative and entrepreneurial economic environment, help our businesses capitalize on opportunities, and provide choice and quality to consumers. The global marketplace continues to evolve, changing with it the dynamics that influence Canada's performance. I am proud to say that the Industry Portfolio is playing its part:

- We are working to make our market for wireless services more competitive, this year launching the policy framework for the Advanced Wireless Services spectrum auction. The framework aims to provide more choice and better service for consumers and businesses — something that we believe will also lead to lower prices.
- We issued guidelines clarifying the application of the Investment Canada Act as it relates to foreign state-owned enterprises investing in our country to ensure that Canadians continue to enjoy all the benefits that foreign investment delivers.
- We instituted an independent Competition Policy Review Panel to review and report on key elements of Canada's competition and investment policies and to ensure that they are working to the full benefit of Canadians.
- We created an Automotive Innovation Fund to provide support to automotive firms undertaking large-scale, strategic research and development (R&D) projects to build innovative, greener and more fuel-efficient vehicles. Similarly, investments made through the Strategic Aerospace and Defence Initiative continue to encourage strategic R&D that will result in innovation and excellence in new products and services.

One of my key priorities as Industry Minister continues to be our country's science and technology (S&T) strategy, *Mobilizing Science and Technology to Canada's Advantage*, announced by Prime Minister Harper in May 2007.

- Budget 2008 included measures and initiatives in support of our S&T Strategy that total $654 million over the next three years.
- We put in place the new Science, Technology and Innovation Council to provide the government with objective policy advice on Canada's S&T issues.
- The government allocated $105 million in 2007–2008 to support the operations of seven new Centres of Excellence, pilot projects that have the potential to make Canada a global leader in fields of research that offer a strategic opportunity for Canadian industry.
- This past March, Canada's two-armed robot, Dextre, was successfully installed on the International Space Station.

This has been a year of progress and success, and it is my pleasure to present the National Research Council Canada's *Departmental Performance Report* for 2007–2008. I am committed to building on these successes in 2008 and beyond, and I will continue to work with officials in the Industry Portfolio to make Canada more efficient, productive and competitive.

Tony Clement
Minister of Industry

Management Representation Statement

I submit for tabling in Parliament, the 2007-2008 Departmental Performance Report for the National Research Council Canada.

This document has been prepared based on the reporting principles contained in the *Guide for the Preparation of Part III of the 2007-2008 Estimates: Reports on Plans and Priorities and Departmental Performance Reports:*

- It adheres to the specific reporting requirements outlined in the Treasury Board Secretariat guidance;
- It is based on the department's Strategic Outcomes and Program Activity Architecture that were approved by the Treasury Board;
- It presents consistent, comprehensive, balanced and reliable information;
- It provides a basis of accountability for the results achieved with the resources and authorities entrusted to it; and
- It reports finances based on approved numbers from the Estimates and the Public Accounts of Canada.

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Dr. Pierre Coulombe
President

Summary Information

Raison d'être

The National Research Council (NRC) is the Government of Canada's leading resource for science and technology (S&T) and innovation with a business focus on:

- improving the social and economic well-being of Canadians;
- fostering industrial and community innovation and growth through technology and industry support; and
- supplying excellence and leadership in research and development (R&D).

Mobilizing Science and Technology to Canada's Advantage through NRC

NRC is moving forward with an important role in helping to achieve the goals of the Government of Canada's Science and Technology Strategy, *Mobilizing Science and Technology to Canada's Advantage*, announced by the Prime Minister in May 2007. The new federal S&T Strategy sets out a multi-year framework to create a competitive advantage for Canada through S&T. It focuses on the principles of promoting world-class excellence, focusing on priorities, fostering partnerships and enhancing accountability. It sets out a plan to foster three distinct S&T advantages for Canada:

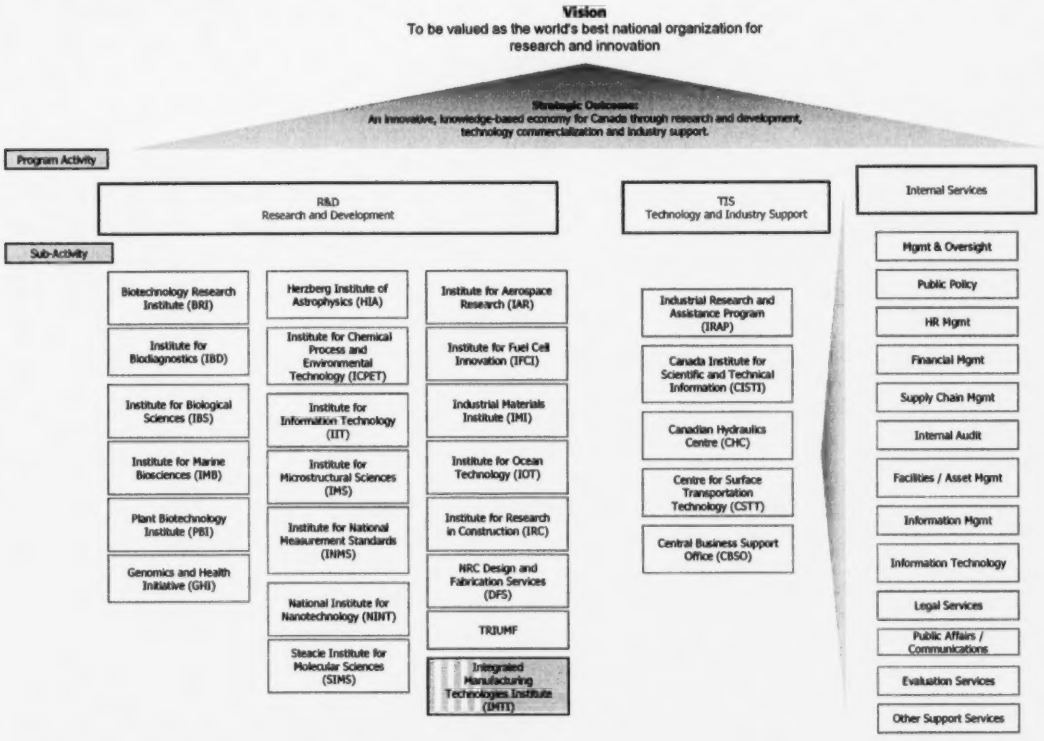
- **Entrepreneurial Advantage** – translating knowledge into commercial applications for greater wealth generation and quality of life;
- **Knowledge Advantage** – being at the leading edge of important developments that generate health, environmental, societal and economic benefits;
- **People Advantage** – attracting highly skilled people and educated people for a flexible workforce that can compete globally.

NRC's own Strategy to 2011, *Science at Work for Canada*, is consistent with these principles and objectives and establishes NRC as an important vehicle to help deliver on the new federal S&T Strategy. NRC is enhancing Canada's Entrepreneurial Advantage by meeting the needs of industry for targeted research and by transferring its discoveries to the private sector. To support Canada's Knowledge Advantage, NRC is strategically contributing to the four research priority areas identified in the federal S&T Strategy: environmental science and technologies; natural resources and energy; health and related life sciences and technologies; and information and communication technologies (ICT). NRC will anticipate and respond to important national priorities by engaging innovation system participants in multi-stakeholder collaborations and developing key competencies that will prepare NRC to support Canada's current and future S&T priorities. Lastly, but critically important, NRC is supporting the People Advantage, by attracting and retaining highly-skilled workers needed to thrive in a global economy. Through establishing entities such as the National Institute for Nanotechnology (NINT) and the NRC Institute for Nutrisciences and Health (NRC-INH), for example, NRC is helping to build strong multidisciplinary teams of international calibre researchers to deliver leading-edge work for Canada.

NRC's Approved Program Activity Architecture

NRC's basis for reporting to Parliament is its Program Activity Architecture (PAA). The PAA seeks to describe how the NRC manages the resources under its control to achieve intended results. Two Program Activities contribute to NRC's strategic outcome. Each Program Activity is in turn associated with several program sub-activities as depicted in the Figure 1-1 below.

Figure 1-1: NRC's Program Activity Architecture


Vision
To be valued as the world's best national organization for research and innovation
Strategic Outcome:
An innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support.
Program Activity
R&D
Research and Development
TIS
Technology and Industry Support
Internal Services
Sub-Activity
Biotechnology Research Institute (BRI)
Institute for Biodiagnostics (IBD)
Institute for Biological Sciences (IBS)
Institute for Marine Biosciences (IMB)
Plant Biotechnology Institute (PBI)
Genomics and Health Initiative (GHI)
Herzberg Institute of Astrophysics (HIA)
Institute for Chemical Process and Environmental Technology (ICPET)
Institute for Information Technology (IIT)
Institute for Microstructural Sciences (IMS)
Institute for National Measurement Standards (INMS)
National Institute for Nanotechnology (NINT)
Steacie Institute for Molecular Sciences (SIMS)
Institute for Aerospace Research (IAR)
Institute for Fuel Cell Innovation (IFCI)
Industrial Materials Institute (IMI)
Institute for Ocean Technology (IOT)
Institute for Research in Construction (IRC)
NRC Design and Fabrication Services (DFS)
TRIUMF
Integrated Manufacturing Technologies Institute (IMTI)
Industrial Research and Assistance Program (IRAP)
Canada Institute for Scientific and Technical Information (CISTI)
Canadian Hydraulics Centre (CHC)
Centre for Surface Transportation Technology (CSTT)
Central Business Support Office (CBSO)
Mgmt & Oversight
Public Policy
HR Mgmt
Financial Mgmt
Supply Chain Mgmt
Internal Audit
Facilities / Asset Mgmt
Information Mgmt
Information Technology
Legal Services
Public Affairs / Communications
Evaluation Services
Other Support Services

Note: As part of the program realignment and priority setting exercise that took place in September 2007, the NRC-Integrated Manufacturing Technologies Institute's resources were re-allocated to the NRC-Industrial Materials Institute and the NRC-Institute for Research in Construction.

Table 1-1: NRC Financial Resources ($ millions)

2007-2008		
Planned Spending	**Total Authorities**	**Actual Spending**
712.4	865.9	771.2

Table 1-2: NRC Human Resources (Full-Time Equivalents)

2007-2008		
Planned	**Actual**	**Difference**
4,044	4,280	(236)

Note: Due to rounding figures may not add to total shown

Table 1-3: Departmental Priorities

Name	Type	Performance Status
1. R&D in Key Sectors and Areas Critical to Canada's Future	Ongoing	Successfully met
2. Community Technology Clustering Initiatives	Previously committed	Successfully met
3. Integrated Industry Support that Engages Key Players	Ongoing	Successfully met
4. Program Management for a Sustainable Organization	Ongoing	Successfully met

Table 1-4: Program Activities by Strategic Outcome

Strategic Outcome: An innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support			**2007-08**		**Contributes to the following priorities**
	Expected results	**Performance Status***	**Planned Spending ($ million)**	**Actual Spending ($ million)**	
Research and Development	• Contribution to the federal S&T strategy and initiatives • Leadership in new and emerging research domains • Excellence in R&D and innovation • Stewardship of large-scale S&T infrastructure • Research that benefits Canadians • Harmonization of international standards • New international S&T alliances	Successfully met	413.88	393.09	Priority 1 and Priority 2
Technology and Industry Support	• Contribution to the federal S&T strategy and initiatives • Advancement of new technology-based companies • Access to new technologies for Canadian companies through patents and licensing • Enhanced innovation capacity of firms • Improved dissemination of knowledge • Supporting Canadian industry	Successfully met	194.00	187.36	Priority 2 and Priority 3

Strategic Outcome: An innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support			2007-08		Contributes to the following priorities
	Expected results	Performance Status*	Planned Spending ($ million)	Actual Spending ($ million)	
Technology Clusters	• Contribution to the federal S&T strategy and initiatives • Competitive research and development base for cluster development • Innovative firms and deep talent pools in regions across Canada • Community ownership of cluster initiatives – local leadership and strategies • Improved quality of life through increased productivity and new technology-based solutions in health, for industry, the environment, etc.	Successfully met	30.04	57.99	Priority 2
Internal Services**	• Establishment of clear corporate strategic direction • Enhanced corporate governance • Enhanced decision support • Effective research management practices • Long-term stability of financial, human and capital resources • Effective communications with NRC stakeholders	Successfully met	74.51	132.71	Priority 4

* Expected Results identified in the NRC 2007-08 RPP apply to a three-year period; therefore, performance is based on the overall progress towards the expected results.

** NRC's Corporate Branches provide policy, program advice and executive support for the coordination and direction of NRC's operations and the NRC Council contributing directly to Priority 4 and in a corporate support capacity, to Priorities 1, 2 and 3.

NRC Benefits to Canadians

NRC delivers on its strategic outcome by creating wealth, knowledge and social capital for Canadians. Figure 1-2 highlights the plans and priorities identified in the 2007-08 to 2009-10 period (as identified in the NRC 2007-08 Report on Plans and Priorities (RPP)).

Figure 1-2: NRC Benefits to Canadians

The Government of Canada
NRC contributes to the Government of Canada's desired outcomes of strong economic growth, an innovative and knowledge-based economy, and a clean and healthy environment.
NRC's Strategic Outcome
An innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support
NRC's Priorities: 2007-08 to 2009-10
1. R&D in Key Sectors and Areas Critical to Canada's Future
• Create value through R&D in sectors with the greatest impact for Canada
• Invest in leading-edge research, including increased horizontal and multi-disciplinary R&D
• Build sustainability through research in areas critical to Canada's future
• Support Canadian industry and research community through codes, standards, and investments in large scale R&D infrastructure
2. Community Technology Clustering Initiatives
• Contribute to the economic viability of Canada's communities
• Help connect industry and key innovation players
• Focus on cluster growth to create critical mass and build community innovation capacity
• Develop a medium for regional delivery of national initiatives
3. Integrated Industry Support that Engages Key Players
• Increase innovation capacity of SMEs and help industry manage risks as new products are developed and marketed
• Offer S&T information and intelligence to industry
• Offer comprehensive commercialization support, including technology transfer and IP management
4. Program Management for a Sustainable & Agile Organization
• NRC Strategy: Science at Work for Canada
• Address Management Accountability Framework commitments
• Continue to address recommendations of the Auditor General of Canada

NRC's Overall Performance for 2007-08

Operating Environment

NRC has unique attributes that shape its operating environment, including:

- A national S&T infrastructure positioned to improve Canada's innovation capacity in existing and emerging fields of research, build networks for researchers and businesses, train highly qualified personnel, create new technology-based companies and jobs and transfer knowledge and technology to Canadian companies.
- A core strength of over 4,000 talented and dedicated people, 17 research institutes, 15 industrial partnership facilities, the Industrial Research Assistance Program (NRC-IRAP), the Canada Institute for Scientific and Technical Information (NRC-CISTI) and two technology centres.
- The ability to help companies move from discoveries in the laboratory to the development, prototyping and commercialization of these ideas and technologies for the global marketplace.
- The capacity to adopt an integrated approach that brings research, technologies and industrial links together to provide access to international S&T infrastructures.
- The skills to manage research projects towards specific outcomes as well as long-term goals.
- The capability to bring together multi-disciplinary research teams to tackle issues of national importance.
- The ability to put together national programs for delivery in regions across the country.

National S&T Infrastructure
NRC delivers a national S&T program with laboratories, centres and facilities in communities across Canada (http://www.nrc-cnrc.gc.ca/contactIBP_e.html).

Ownership, Management and Maintenance of Capital Assets
Responsible for its own highly technical and complex operations, NRC manages 185 buildings totalling approximately 560,140 square metres of space.

Funding
NRC is funded through government appropriations. In the course of providing technical services to companies and other organizations, it recovers its costs for the purpose of reinvesting in the operation and maintenance of equipment and facilities.

Internal Factors
The ability to perform at the leading-edge of R&D and to support Canadian industry in becoming more technology intensive and innovation-driven requires the best available equipment, facilities and highly qualified scientists, engineers, technicians and other professionals. NRC faced challenges in sustaining these key resources over the last several years and focused on strategies to address them.

In 2007-08, NRC initiated a review of all of its programs under its R&D Program Activity. This reorientation and refocusing of NRC's R&D activities was done to enable NRC to better focus on its strategies, build critical mass and be a more responsive, agile and sustainable organization. This exercise was part of an organizational shift towards key sector plans, the development and implementation of national programs and the drive for new partnerships. Of note, the London-based NRC-Integrated Manufacturing Technologies Institute was eliminated as a stand-alone entity and instead NRC has concentrated its research competencies in its construction and manufacturing programs. At the NRC-Institute for Marine Biosciences (NRC-IMB) in Halifax, NRC shifted some of its research activities away from a thrust in aquaculture to programs that better link with national priorities, particularly health and wellness. As well, the Urban Roads subprogram of the NRC-Institute for Research in Construction (NRC-IRC) was discontinued as it was determined that those activities could be more effectively be performed by the academic sector. Other changes were implemented in order to eliminate or realign research activities which were deemed to be a low priority, or demonstrated low efficiency, effectiveness, or relevancy. As a result, in September 2007, 88 employees in indeterminate (continuing) positions were workforce adjusted. Following this exercise, NRC placed 48% of surplus employees into assignments or continuing positions. The placement rate by bargaining agent was 57% for Research Council Employees' Association and 23% for Professional Institute of the Public Service of Canada. In terms of regional impact, the greatest impact was in London, Ottawa, and Halifax.

In 2007-08, NRC began implementation of a new organizational structure for its communications function. It aligns with, and positions NRC's communications function, structure, competencies and resources to support NRC's Strategy as well as relevant Government of Canada S&T priorities.

External Factors
Economic Context – Canadian economic performance continued at a solid pace in 2007 with a real gross domestic product (GDP) growth rate of 2.7%, a slight deceleration from the 2.8% in 2006,

matching the average growth for the past five years.[1] Real personal expenditure on consumer goods and services was the strongest contributor, advancing 4.7% in 2007, its best performance since 1985. Labour income (up 6.1%) and corporate profits (up 5.8%) contributed to that strength.[2]

Employment creation was at a three-decade high, bringing the unemployment rate down to 6% for 2007, its lowest level since 1974. Employment grew 2.3% with 382,100 net new jobs created. Over three times as many full time jobs were created as part time jobs (293,400 versus 88,600), but growth in part time jobs was faster at 3% than that of full time jobs at 2.2%, in contrast to the two previous years where full time job growth exceeded part time job growth.[3]

Relative to key currencies, the annual average value of the Canadian dollar appreciated against the U.S. dollar and the Japanese yen in 2007, by 5.5 % and 6.9% respectively in 2007, continuing the trend that began in 2003. The trend changed however against the euro and the pound with the Canadian dollar depreciating by 3.1% and 2.8%, respectively, on an annual average basis.[4]

In Canada, private equity firms raised $5.8 billion in 2007, compared to $10.3 billion in 2006. Venture capital, accounted for 20% of the private equity market in 2007 compared to 16% in 2006. Venture capital activity focused even more heavily on expansion and other late-stage transactions in 2007, which captured 62% of total dollars invested. The higher levels of venture capital market activity experienced in 2007 can be attributed largely to the quality and quantity of opportunities on offer in Canada's emerging technology sectors.[5]

Dynamic local sector clusters and entrepreneurial communities have attracted more attention from risk investors, both at home and abroad. In 2007, Canada saw rising activity across all major sectors of interest – communications and IT, biopharmaceuticals and other life sciences and, increasingly, environmental technology. Key urban locales, such as Vancouver, Toronto, Waterloo, Ottawa and Montreal, are being recognized globally as fast-maturing innovative hubs, spawning a number of promising startups.[6]

Performance on 2007-08 Priorities

The following section summarizes NRC'S overall performance in relation to its 2007-08 priorities, listed in Table 1-3.

1. R&D in Key Sectors and Areas Critical to Canada's Future – Successfully met.

Research and innovation are critical to Canada's future economic growth and an improved quality of life for Canadians. As Canada's foremost R&D agency, NRC concentrates its efforts on two vital elements of R&D excellence: quality and relevance. In 2007-08, NRC played a key role in helping Canada reach its full potential by performing research in fields that are of current and future importance from a social and economic perspective, in line with the federal S&T Strategy.

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[1] Canada's State of Trade: Trade and Investment Update 2008, http://www.dfait-maeci.gc.ca/eet/pdf/DFAIT_State_of_Trade-2008_e.pdf
[2] Ibid
[3] Ibid
[4] Ibid
[5] Private Equity Canada 2007, Thomson Reuters Canada and McKinsey & Company. http://www.canadavc.com/files/public/PrivateEquityCanada2007.pdf
[6] Ibid

NRC's R&D provided Canadian companies with increased access to new technologies through patents and licences creating an Entrepreneurial Advantage for Canada. In 2007-08, NRC R&D led directly to the creation of intellectual property (IP), with 196 patents applied for during the year and 69 patents obtained from applications made in previous years. NRC also signed 98 new technology licensing agreements with industry, contributing to the flow of innovation into business applications. These activities contributed to the program activity's expected result of advancement of new technology-based companies. NRC researchers published technical reports, presented papers in conference proceedings and produced technical reports for clients during the year, disseminating knowledge for innovation and long-term value creation for Canadian industry and the public at large.

NRC's leadership standing in new and emerging research domains remained high. To contribute to Canada's S&T Knowledge Advantage, NRC conducted research in areas of economic and social importance. From an economic perspective, investment and research in aerospace technology such as composite material aircraft components and turbine engine icing certification has kept Canada among the world leaders in this sector. Nanotechnology R&D at NRC resulted in advances to extend the service life of concrete and established novel approaches to nano-engineering of concrete structures. Improved materials, catalysts and advanced modeling and testing methods continued to solidify Canada's position at the leading-edge of fuel cell technology.

NRC also completed R&D activities that contributed to the well-being of Canadians. Genome research is ongoing in areas such as food production (e.g., productivity of canola crops) and treating of human and animal disease (e.g., cancer identification, diagnostic tools for heart attack patients, controlling human cholesterol levels). NRC researchers also conducted research in the areas of bioactives and nutraceuticals. Extracts and bioactives from such plants as cranberries, blueberries, hemp, hops and poppies were screened and evaluated for anti-oxidant, neuro-regeneration and anti-cancer effects. Novel techniques using magnetic resonance imaging (MRI) technology were developed and tested with positive results. These will eventually lead to less invasive diagnosis of breast cancer. R&D work was also completed to develop analytical methods for rapid and highly sensitive detection of chemical warfare agents, toxic agrochemicals and other toxins, to enhance the security of Canadians.

Collaborating with industry and academia to further scientific frontiers was also a cornerstone activity for NRC during the reporting period. Major contributions in astronomy, sub-atomic particle physics and neutron beam experiments were made, such as:

- Nanowave Technologies of Etobicoke, Ontario licensed a component of the Band 3 receivers, developed by NRC for the Atacama Large Millimetre Array (ALMA) , manufacturing the 300 amplifiers needed for ALMA and marketing the technology globally to universities, research labs and semiconductor companies to be used in telecommunication systems, solid state physics research, materials research and low temperature physics research.
- The Canadian Neutron Beam Centre (CNBC) applied new neutron beam methods to soft materials and nanostructures and employed a new specialized spectrometer to study new hydrogen storage materials for clean energy.
- The TRIUMF experimental facility TITAN made a mass measurement of Lithium-11 and Helium-8, the world's first precision measurement of these extremely short-lived isotopes.

NRC also continued to work with international standards bodies, ensuring compatibility of Canada's National Metrology Standards with those around the globe, assisting in the development of new measurement science (e.g., nanotechnology) and determining standards and methods of measurement that impact directly on the ability of Canadian firms to trade internationally.

2. Community Technology Clustering Initiatives – Successfully met.

In support of Canada's S&T Knowledge Advantage, NRC continued to explore and develop innovative models for S&T partnership and collaboration between federal departments and agencies and other sectors. During the reporting period, NRC was involved in the ongoing development of 11 technology clusters across the country. Technology clusters are community partnerships focused on building competitive advantage through research and innovation. NRC helped clusters develop technology road maps and fostered alliances that are being used to transfer technology to the cluster participants. These clusters focus on areas such as life sciences, information technology and e-business, ocean technology, aluminium transformation, photonics, biomedical technologies, plants for health and wellness, nanotechnology, fuel cell and hydrogen technology, nutrisciences and health, and sustainable infrastructure. Priority 2 contributes to the achievement of NRC's Strategic Outcome by fostering innovation and economic growth through community partnerships.

To contribute to increasing the impact of federal business R&D assistance programs, NRC-IRAP engaged and linked regional groups, through development of technical, financial and business networks that are the foundation of technology clusters. Over $1.5 million was contributed to 45 innovation support organizations within six of the technology clusters in which NRC is involved and nearly $1.3 million in non-repayable contributions were made to 30 individual firms within the clusters, toward technological research projects. Examples of cluster successes during the year include a $40 million initial public offering (IPO) of IMRIS Inc., a spin-off of NRC Institute for Biodiagnostics (NRC-IBD) within the Manitoba Biomedical cluster and filing of a patent on a biomarker for prostate cancer jointly between NRC-IIT and the Atlantic Cancer Research Institute, from the New Brunswick information technology cluster.

NRC also continued to develop, build and operate Industry Partnership Facilities (IPFs) across Canada, providing unique facilities that are workplaces for collaborative research and incubation of new firms, including NRC spin-offs. IPFs also serve as resource locations for small- and medium-sized Enterprises (SMEs) and new enterprises. NRC currently has 15 IPF locations across the country, supporting 140 incubating firms in 2007-08, an increase of 10% from the previous reporting period.

3. Integrated Industry Support that Engages Key Players – Successfully met.

In 2007-08, the NRC Technology and Industry Support (TIS) portfolio worked closely with the NRC R&D portfolio to support the Government of Canada's commercialization priority under the Entrepreneurial Advantage. Activities to increase the commercialization of research include technology licensing, provision of pre-commercialization assistance, mentoring and provision of business intelligence, access to national and international networks, knowledge dissemination and expertise, as well as helping companies create new products and/or technologies.

Industrial Technology Advisors (ITAs) from NRC utilized in-house developed capabilities to capture competitive technical intelligence to support Canadian industry. This facilitated better decision making on technology investments and research directions for NRC clients. An assessment completed during the year indicated that over the previous five years, NRC-IRAP client firms' sales grew an average of 28% and overall firm employment grew 30%, with company assets growing by 15%.

NRC provides access to S&T information and intelligence to industry, with sophisticated tools and services to accelerate discovery, innovation and commercialization within Canada's research and innovation community. During the reporting period, NRC completed 485,000 document orders for clients in the academic, health, government and industry sectors. A new suite of services, under the *Discover* banner, was launched to provide Canadians with faster and easier access to over 15 million S&T articles in the collection. The NRC Virtual Library provided NRC institute researchers with desktop access to licensed electronic journals and databases, with 258,000 site visits accumulated during the year. NRC continued to publish scientific journals, which have over 13,900 subscribers in 101 countries. In 2007-08, 6,192 authors were published in 16 respected, peer-reviewed journals. NRC published five books during the year, with another nine in production.

A 2007 Impact Evaluation found the extent to which NRC-IRAP, a federal business R&D assistance program, stimulates wealth creation within Canada is demonstrated by the overall net socio-economic benefits that it generates. By aggregating the impacts resulting from individual client-firm's sales growth, cost reductions and the value of the advisory services provided to Canadian SMEs, between 2002 and 2007, the total wealth creation benefits of NRC-IRAP were in the range of $2.3 to $6.5 billion.

4. Program Management for a Sustainable Organization – Successfully met.

Performing leading-edge R&D and supporting Canadian industry to become more technology intensive and innovative requires state-of-the-art equipment and infrastructure, as well as highly skilled scientists, engineers, technicians and other professionals. During the reporting period, NRC established its corporate business plan for the next three fiscal years. The plan outlines an approach to enhance the financial flexibility of NRC, while ensuring financial and non-financial resources are aligned in support of the organization's priority programs. NRC initiated a new organizational resource allocation process during the fourth quarter of 2007-08, requiring all institutes, programs and branches to develop and submit business plans annually. Funding of initiatives was based on the alignment of individual business plans with the corporate plan and the requirement to help NRC deliver on its priorities and the federal S&T Strategy.

Significant investments in S&T infrastructure were also made during the year. Approximately $5.7 million was invested to address the most pressing infrastructure needs, focusing on health and safety, as well as asset life-cycle management. NRC also continued to invest in internal audit capacity, to assist in maintaining accountability across its program delivery. Five internal audits were conducted during the period and six more initiated. The independent Audit, Evaluation and Risk Management Committee, a sub-committee of NRC Council, which is comprised of members external to NRC, reviewed these reports. From an external audit perspective, NRC is currently addressing the recommendations provided by the Office of the Auditor General (OAG).

Section II – Analysis of Program Activities

This section provides an overview of how NRC's Program Activities contributed to the progress made toward its strategic outcome. NRC Program Activities provide a balance between conducting R&D and delivering technical and innovation support services to industry and the public.

Strategic Outcome

An innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support.

Program Activity: Research and Development

This program activity includes research programs, technology development initiatives and management of national science and engineering facilities. These efforts all focus on key technological and industrial areas of Canada's economy where NRC has specific roles and recognized competencies and where it can have a significant impact.

Financial Resources ($ million)		
Planned	**Total Authorities**	**Actual**
493.1	636.4	549.5

Human Resources – Full Time Equivalent (FTEs)		
Planned	**Actual**	**Difference**
3,160	3,258	(98)

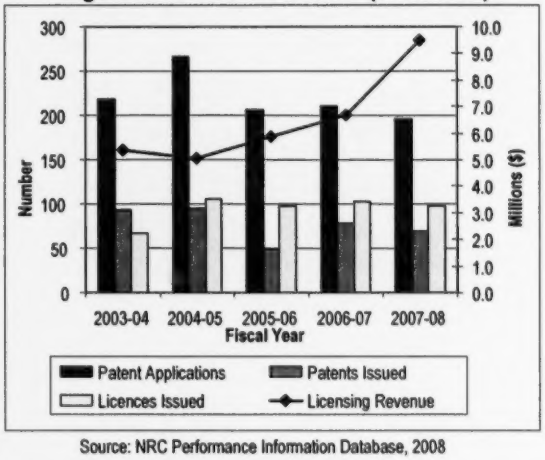
Performance Highlights

Performance Indicators (as identified in the 2007-08 RPP)	**Results**
Technology transfer (patents, licences)	– 69 new patents received – 196 new patent applications – 98 licences issued
Spin offs/ ins	– 68 companies created since 1995
Publications in refereed journals / proceedings and technical reports	– 1,330 published articles in refereed journals – 1,541 technical reports produced
External grants	– 207 grants provided to NRC researchers and their partners
Leadership and contribution to federal horizontal initiatives	– Genomics R&D Horizontal Initiative - Licensing agreement with a Canadian biotech company for the worldwide therapeutic and diagnostic rights to Clusterin-specific antibodies for the treatment of cancer.
Multi-researcher networks and centres of excellence	– Participated in 118 research networks – 217 positions held on editorial boards of scientific journals – 473 adjunct professorships appointments in Canadian universities
Number and value of international collaborative agreements	– 118 new international collaborative agreements worth $109 million – 407 new Canadian collaborative agreements with partners worth $159 million
Increase in research collaborations, licensing, joint patent applications, etc.	– 42% increase in licensing revenue

Research and innovation are critical to Canada's future economic growth and an improved quality of life for Canadians. As Canada's foremost R&D agency, NRC concentrates its efforts on two vital elements of R&D excellence: quality and relevance. In 2007-08, NRC played a key role in helping Canada reach its full potential by performing research in fields that are of current and future importance to the Canadian economy and that addressed important public and Government priorities. To achieve this, NRC worked in collaboration with industry, university and government partners in Canada and abroad. Creating value from knowledge, providing a national S&T infrastructure, maintaining and fostering international alliances and supporting the commercialization of federal R&D are integral parts of NRC's business.

A new patent is a key step in the continuum from discovery to innovation. The strategic management of IP contributes to the innovative capacity of firms. In 2007-08, NRC applied for 196 new patents and secured 69 patents from applications made in previous years. Forty-nine percent of these were issued in the U.S., an Organisation for Economic Cooperation and Development (OECD) recognized measure of competitiveness. Based on a 2003 benchmarking study of best practices in IP management, conducted internally, NRC changed its approach to screen disclosures early; conduct market research and patent analysis assessments; and regularly review its IP portfolio to generate, identify and develop more "high potential commercial value" IP.

Figure 2-1: NRC IP Portfolio (2003-2008)



Source: NRC Performance Information Database, 2008

By negotiating a licence agreement to use NRC technology, an industrial partner endorses the merit of NRC research and these agreements show a direct flow of innovation into business application. NRC entered into 98 new licence agreements in 2007-08 and IP licensing revenue was $9.47 million (see Figure 2-1).

Just over $4.1 million of IP revenue in 2007-08 was attributed directly to the Meningitis-C vaccine developed by the NRC Institute for Biological Sciences (NRC-IBS). The Institute for Research in Construction (NRC-IRC) received approximately $2.0 million from several provinces for the use of information published as part of the National Building and Fire codes and used in individual provincial codes.

Some other examples of NRC technology licensed to industry in 2007-08 include:

- NRC Institute for Aerospace Research (NRC-IAR) signed a licensing agreement with Standard Aero Limited for non-destructive evaluation methods and associated component life-assessment techniques used in gas turbine engines. This licence increased the capabilities of the Canadian firm in supplying services to the international engine repair market.
- The SIGDERS Dynamic (testing) Roofing Facility Unit was licensed by NRC-IRC to Les Laboratoires Shermont in April 2007.

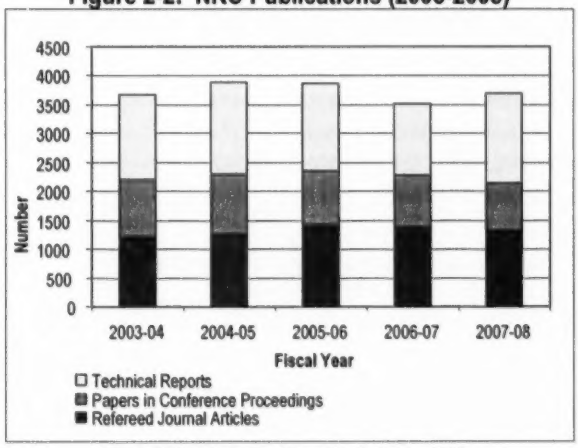
- NRC Industrial Materials Institute (NRC-IMI) licensed low-coherence light interferometry scanner technology to Biocad Inc., for facilitating the installation of dental implants. Biocad has grown in both revenue and employment and has recently signed several marketing agreements with U.S and European partners.
- Tecnar Automation Ltd., one of the first NRC-IMI spin-offs, was granted a licence for technology to conduct real-time analysis for improving the quality of galvanized steel plates used in the automotive industry.
- NRC-IAR transferred Resin Transfer Molding (RTM) technology capabilities to Delastek, a Canadian SME. This transfer permitted Delastek to become the first RTM aerospace grade parts manufacturer in Canada, moving from the production of recreational vehicle parts to aerospace components.

Patents, licence agreements and collaborative research agreements can be used to help demonstrate the commercialization outcomes of NRC's R&D and their contribution to an Entrepreneurial Advantage for Canada.

When NRC develops a technology with particularly strong market potential and no Canadian receptor capacity identified, entirely new companies may be created to commercialize the technology. These new companies create innovative products and services for the global marketplace and new jobs for Canadians. In 2007-08, the total new companies created since 1995 remained at 68, accounting for approximately 552 full-time jobs and an estimated $470 million in cumulative investment, an 8% increase from last year. In 2007, investment from all sources into NRC new companies was $87 million.[7]

Scientific papers in leading peer-reviewed publications and conference proceedings are traditional internationally recognized measures of research quality and relevance. They are also a key tool for the dissemination of knowledge and the creation of value for Canada in the long-term. NRC has consistently produced over a thousand peer-reviewed publications each year over the last five years. In 2007-08, researchers published 1,330 articles in refereed journals. NRC researchers also presented 821 papers at S&T conferences and produced 1,541 technical reports for clients (see Figure 2-2).

Figure 2-2: NRC Publications (2003-2008)



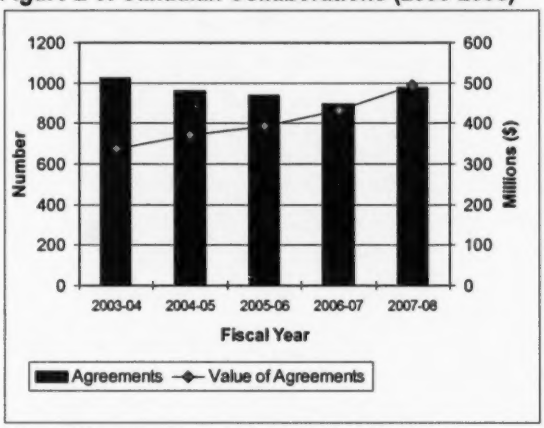
Source: NRC Performance Information Database, 2008

NRC's research excellence is also evident in the involvement of its researchers in multi-researcher networks and centres of excellence as well as the number of externally funded, peer-reviewed research grant proposals. In 2007-08, NRC researchers participated in 118 research networks,

[7] Adventus Research Inc., *Economic Impact of National Research Council Canada Spin-Off Companies 2008 Survey*, March 26, 2008.

held 217 positions in editorial boards of scientific journals and were appointed to 473 adjunct professorships in Canadian universities. In 2007-08, NRC researchers and their university partners received 207 grants from Canadian granting agencies (such as NSERC and Genome Canada). The total of these grants, over the lifetime of the projects equalled $29.3 million.

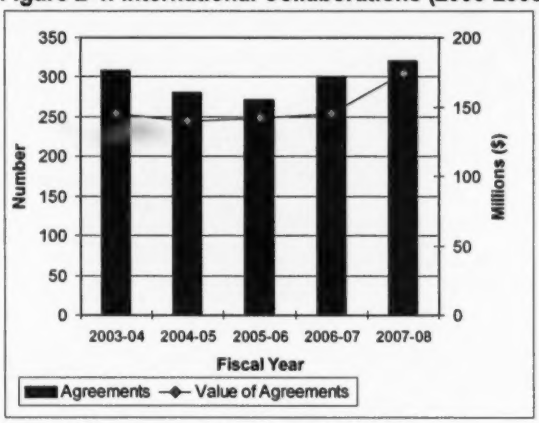
Figure 2-3: Canadian Collaborations (2003-2008)



Source: NRC Performance Information Database, 2008.

In addition to working with university partners, NRC signed 407 new collaborative research agreements with Canadian partners worth a total of $159 million in 2007-08. The total value over the lifetime of these agreements grew to $493 million (see Figure 2-3). The number and value of collaborative agreements signed during a year are indicators that foretell increased research activity. NRC's Canadian partners invest $3.10 for every dollar NRC invests.

Figure 2-4: International Collaborations (2003-2008)



Source: NRC Performance Information Database, 2008

Participation in international projects and consortia exposes Canadian students, researchers and companies to the best-in-the-world capabilities. In 2007-08, NRC signed 118 new collaborative research agreements with international partners worth $109 million. The total number of active international collaborative agreements is similar to last year's number (see Figure 2-4), with a total value over the lifetime of the agreements of close to $174 million. NRC's international partners invest $3.41 for every dollar NRC invests.

Delivering on Expected Results

Through its 19 research institutes and technology centres, NRC conducts long-term research in virtually every S&T-driven sector of the Canadian economy. In 2007-08, NRC focused on those sectors identified as having economic and social importance to Canada, and within those sectors, concentrated on four research priority areas identified in the federal S&T Strategy, namely environmental science and technologies; natural resources and energy; health and related life sciences and technologies; and information and communication technologies (ICT). In keeping with one of the Strategy's core principles – partnerships – NRC pursued horizontal initiatives and

S&T collaborations among federal departments and agencies and between the federal S&T community and universities, industry, and the non-profit sector. The expected results of this program activity, as outlined in the NRC 2007-08 Report on Plans and Priorities were:

Expected Results:
1. Contribution to the federal S&T Strategy and initiatives
2. Leadership in new and emerging research domains
3. Excellence in R&D and innovation
4. Stewardship of large-scale S&T infrastructure
5. Research that benefits Canadians
6. Harmonization of international standards
7. New international S&T alliances

Achievements against the expected results are highlighted below. The results are organized in terms of contributions to the four priority areas and the core partnership principle of the federal S&T Strategy.

Environmental science and technologies

The following highlights progress on research within sectors that have economic or social benefits for Canada, with environmental technology elements.

Facilitated Canada's technology advantage in next generation aerospace industry – Expected Results 1, 3. Aerospace remains one of Canada's most important advanced technology sectors. The NRC-IAR Aerospace Manufacturing Technology Centre (AMTC) was designed to support the complete aerospace manufacturing supply chain, from SMEs to Aerospace Primes, in the development and implementation of modern manufacturing methods with the potential of cost savings. In 2007-08, the AMCT facilitated the advancement of one SME Tier 3 supplier to the position of a major Tier 2 system integrator. This particular SME utilized the Centre's Automated Fibre Placement (AFP) machine to assist in the fabrication of fuselage sized composite material aircraft parts. The AFP provides a technology advantage for Canadian industry, as new environmentally friendly composite structures and other large components are quickly becoming prevalent in new aircraft designs. In addition, AMCT developed technology for coordinating robotic riveting and parts assembly within the aerospace industry and technology for high-speed grinding and materials removal. This advanced manufacturing technology was successfully transferred to the Canadian automotive industry.

During the reporting period, NRC-IAR's Structure and Materials Performance Laboratory continued to advance research in the areas of micro-hardness and elastic modulus, for important developments in nanocrystalline covalent materials. These new materials are for use in aerospace applications, initially in new coatings for gas turbine engines. The manufacture of gas turbine engines is a major component of the Canadian aerospace sector. Using modeling and simulation, NRC identified and selected new materials, which do not yet exist. This innovative approach considerably reduces the time to develop new materials and thereby brings them to market both at a faster and lesser cost than traditional approaches. The NRC-IAR-Gas Turbine Laboratory (GTL) established a preeminent large engine icing certification facility at Mirabel Airport, considered to be among the top three in the world. This facility provides a technology advantage for engine

manufacturers, through enhanced cost-effective access to a world-class facility, at a time when alternative international facilities are increasingly schedule-constrained and expensive.

Position Canadian industry as a key player in advanced manufacturing – Expected Results 1, 3, 5. Advanced technologies are a key element to advancing manufacturing capabilities, expertise and ultimately retaining manufacturing employment within Canada. NRC R&D continued its ongoing contributions in this area. NRC-IMI continued to focus on engineering materials and the manufacturing sector. It supported the aluminum technology cluster in Saguenay, Quebec, the Industry Partnership Facility in Boucherville, Quebec and the Canadian automotive industry in London, Ontario. In London, NRC conducted an Opportunity Assessment Study in the fall of 2007, as the first phase of development of its automotive sector strategy. The findings point to potential environmental and energy benefits for the proposed direction of the NRC Automotive key sector on lightweight structural materials and alternative automotive propulsion systems. The study was presented to, and endorsed by, the Automotive Key Sector Steering Committee and NRC's Senior Executive Committee. During 2007-08, NRC also provided access to sophisticated laboratories to manufactures for conducting pilot projects to demonstrate and validate new manufacturing technologies.

With a focus on energy oriented processes and solution-driven materials to benefit the environment, the Institute for Chemical Process and Environmental Technology (NRC-ICPET) led the Advanced Electrical Storage Project that focused on four elements of technology development for the plug-in hybrid electrical vehicle (pHEV). These are energy storage, electrical drive components, power train optimization and regulations for emissions and fuel efficiency. The program is working with half a dozen Canadian companies who have produced prototypes. New technologies are being made available to industry as they evolve. The Program has registered nine patents and has issued licences to over 30 organizations, enabling the development of high-performance lithium ion cells for pHEVs and associated applications.

Continued to support Canada's commitment to reduce green house gas emissions and improve the environment – Expected Results 1, 2, 5. Aligning with the federal S&T Strategy, a number of NRC research institutes and programs applied their knowledge and competencies to climate change, energy, the environment and sustainable development. NRC-IRC commenced a four year Indoor Air Research Initiative as part of the federal government's Clear Air Agenda. To date, staff has completed the first phase of construction of the ventilation facility, prepared draft protocols for field experiments on Indoor Air Quality (IAQ) and health measures and secured new equipment for: a) the effective and comprehensive detection of contaminants, b) the automation of field measurements and c) the evaluation of IAQ products. In addition, a camera-based sensor for control of electric lighting and window blinds was developed to assist in energy conservation in the presence of natural light or when rooms are unoccupied. In addition, a long-term monitoring system for thermal comfort at individual workstations was developed, with its initial implementation at an office location in Toronto, to capture data for a three-month period. A new portable monitoring system was developed for measuring a host of indoor environmental conditions, with its first application scheduled to be a post-occupancy evaluation of "green" buildings. The long-term objective of this tool is the refinement of "green" building rating schemes.

Environmental technologies for the protection of water resources – Expected Results 1, 5, 7. Fresh water is a critical resource throughout the world, with the protection and remediation of

ground and surface water an important element to improving the lives of people, including many Canadians. The NRC-BRI EMaMoc technology for the bioremediation of TCE (a human carcinogen) and other toxic substances from groundwater was transferred to a Canadian company through a licence agreement for commercialization in Canada and in Europe. This technology can help address major groundwater problems where TCE affects drinking water resources in groundwater aquifers, a major source of drinking water to Canadians. NRC-BRI in collaboration with the Université du Québec à Montréal in Quebec also developed a new bio-monitoring tool for the detection of cyanobacteria in surface water and lakes. Toxins produced by cyanobacteria represent a high risk to humans. Cyanobacteria algal blooms have affected several lakes in Quebec limiting the use of water resources to local residents.

Natural Resources and Energy

The following highlights progress on research within sectors that have economic or social benefits for Canada, with natural resources and energy elements.

Support Canada's leadership in Fuel Cells – Expected Results 1, 2, 3, 5. Fuel cell technology can provide a significant contribution to lessening the environmental impact we have on the planet. This is an international priority, and Canada has been a leader in the formative development of this technology. The Institute for Fuel Cell Innovation (NRC-IFCI) helped Canadian industry remain at the leading-edge of fuel cell technology. During the reporting period, research led to reducing costs for the manufacture of fuel cells by minimizing the amount of platinum required; improving efficiency through enhanced catalyst layer design and; increasing design integrity and reducing overall design time by utilizing advanced computer modeling tools during the design phase.

NRC-IFCI's Technology Centre and its Incubation/Acceleration and Networking Facility provided opportunity for SMEs' technology acceleration, integrated technology demonstrations and industry-university-government partnerships, contributing to Canada's entrepreneurial advantage. During the reporting period, NRC scientists broke a number of barriers to develop the next generation of Proton Exchange Membrane Fuel Cells (PEMFC) that work at high temperatures and Solid Oxide Fuel Cells (SOFC) that work at low temperatures. NRC-IFCI developed Cermet supported SOFCs are becoming the benchmark product for further research in both Canada and Europe.

NRC-IFCI also developed a novel architecture to deal with "dirty" fuels for SOFCs, using a tin anode, which has demonstrated higher performance than conventional technology found in the literature. Increasing the types of fuels usable by fuel cells contributes to wider adoption of the technology, ultimately reducing greenhouse gases.

In addition, the Centre developed an in-depth fuel cell safety methodology for fuel cell laboratories that is being considered for International Organization for Standardization (ISO) certification. Furthermore, standards for Hydrogen sensors were developed in collaboration with partners Ballard and Natural Resources Canada and these were approved internationally and adopted as ISO Standards, benefiting the entire Canadian advanced manufacturing industry.

The NRC-IFCI in Vancouver is home to the NRC Fuel Cell Program. This Program mobilized fuel cell expertise and research strength from a network of NRC research institutes across Canada. A total of $6.2 million over five years from 2003-04 through 2007-08 was allocated by the Climate

Change Technology and Innovation Program to NRC's Fuel Cell and Hydrogen Program – a key horizontal initiative. NRC supplemented this investment with an additional $15 million of reallocations from existing A-base. The program has enabled collaboration across NRC and the development of key competencies in this important area. The program ended in March 2008. This year the program produced seven patents/patent applications, 64 published papers and 51 conference presentations. Overall, results for the 5-year program include 31 patent applications, 268 published papers over 50 conference presentations. These outcomes will provide a solid base for the collaborative program being planned this year by NRC, NSERC and Natural Resources Canada (NRCan) to focus on near-term technologies, bringing together capabilities within government and in universities to work with industry on fuel cell and hydrogen technology solutions.

In line with Canada's S&T Strategy, NRC continued to participate in collaborative research initiatives to improve the recovery of energy from traditional sources and develop alternative forms of energy. Within Natural Resources Canada's Advanced Fuels Technology and Emission Reduction program, NRC-ICPET led the development of a newly patented optically based technology known as Laser-induced Incandescence (LII). This technology helps enforce some of the world's toughest vehicle emission standards and it is licensed to a broad range of users, from regulatory agencies to vehicle designers. Environment Canada has used LII to measure particulate emissions from advanced vehicle technologies to provide key insights into the tradeoffs between improved fuel efficiency and increased particulate emissions, which is a significant contributor to climate change.

Build sustainability through oceans science – Expected Results 1, 2, 5. Canada's oceans are a strategic resource of prime importance to humanity, the environment and industry. The Institute for Ocean Technology (NRC-IOT) integrates advanced technologies to achieve innovative solutions to meet the challenges relating to safe and efficient transportation, energy exploration and production, alternative energy, arctic navigation, seabed mapping and information gathering on the state of the oceans. The most advanced technologies for ocean observation and monitoring are autonomous underwater vehicles (AUV). During the reporting period, NRC-IOT conducted AUV deployments at the edge of the continental shelf in Newfoundland and under glacial ice off the coast of Greenland. The Institute identified new applications for AUV technology and continued to work with partners to further develop and integrate this technology for advancing ocean science.

Health and related life sciences and technologies

The following highlights progress on research within sectors that have economic or social benefits for Canada, with health and life sciences elements.

NRC Genomics and Health Initiative – Expected Results 1, 3, 5. The NRC Genomics and Health Initiative continued to invest in large-scale horizontal research programs focused on bringing the benefits of rapid advances in the genome sciences and health research to a variety of Canadian industrial sectors. In 2007-08, the final year of its third phase of research activity, NRC invested over $22 million in research programs oriented toward diagnosing, treating and preventing human and animal disease, developing technologies for pathogen detection and advancing new technologies for cardiac care and the production of commercially valuable agricultural crops. During the reporting period, the fourth phase of research activity was established, with the focus on

research areas that will have socio-economic impact on Canadians including rehearsal systems for brain tumour surgery, productivity of canola crops, point of care diagnostic devices, cancer identification and diagnostic tools for heart attack patients.

Natural health products and nutraceuticals – Expected Results 1, 2, 5. NRC-PBI continued working to enhance the innovative capacity and competitiveness of the Canadian plant-based natural health products industry for the health and wellness of Canadians by leading efforts to create a world recognized plant-based natural health products industry in functional foods, natural health products and nutraceuticals. In 2007-08, NRC established the Bioaccess Commercialization Centre, helping 47 client organizations in Western Canada by providing research expertise, business development support programs, expert business knowledge, resources and advice. Specific programs included BioPitch, a structured hands-on program that teaches entrepreneurs to turn their ideas into a compelling pitch that captures the attention of partners and investors; BioMap, an online resource that takes entrepreneurs from the idea stage to the launch of a new product; and BioFutures, a guide for future technology innovation in the industry. In addition, NRC-PBI performed field trials on plants for two commercially valuable products (nervonic acid for brain health and phytosterols for cardiac health), screened plant extracts from over 100 Western Canadian plants for anti-oxidant, neuro-regeneration and anti-cancer effects, evaluated blueberries, cranberries and grapes to identify bioactives associated with health benefits in fruit and characterized bioactives in hemp, hops and poppies.

Scientists at NRC-INH are also involved in identifying how bioactive compounds found in nature can be used to improve human and animal health. During the reporting period, NRC researchers filed for patent protection for plant extract combinations for cholesterol management, lipid regulation and weight loss. A plant extract for control of pox virus infections was discovered and in cooperation with University of Prince Edward Island researchers, a novel assay to identify compounds to potentially protect against, or limit the damage of strokes was developed.

Vaccines and pharmaceuticals – Expected Results 1, 3, 5. The Biotechnology Research Institute (NRC-BRI) continued collaborating with Canadian pharmaceutical and biopharmaceutical players and pursuing research opportunities to support domestic production of vaccines. In particular, NRC:

- Initiated negotiations with Alethia Biotherapeutics for an exclusive licence for Clusterin mAbs. NRC scientists had identified antibodies that target Clusterin, a discovery that could lead to blocking metastasis of some types of cancer.
- Worked with Chlorion Pharma Inc. to screen for compounds to guide the development of drug leads for pain management. The screening was successful, leading to the design of a number of drug candidates, which are currently being tested. Based in large part on the promise of the company's unique target and interesting compounds obtained with the help of NRC, Chlorion successfully raised $6 million in venture capital funding. This allowed the company to recruit a team of medicinal chemists and pharmacologists to develop lead compounds and conduct pre-clinical studies.
- Provided assistance to Canadian SMEs to facilitate development and commercialization of their technologies. For example, NRC produced material for Artemis Technologies (rabies vaccine development) and for Oncolytics Biotech (Reolysin - experimental treatment for brain tumours).

- Exceeded its commitment to Sanofi Pasteur by producing, purifying and delivering an increased volume (more than six times) of bacterial protein for the development of its new vaccine. Sanofi indicated that the quality and level of service provided by NRC under the contract has greatly assisted its start-up of manufacturing, improving the opportunity for additional contracts during development and scale-up.

NRC-IBS also supported this strategy, through:

- Transformative Vaccine Formulation and Delivery: working with Piramel Life Sciences Limited, one of India's largest health care companies, NRC moved the promising archaeosome (a microbe) technology into preclinical evaluations for a first vaccine candidate in 2009. To overcome complexities during production, NRC scientists developed a semi-synthetic method for production of archeosome-based vaccines and this technology resulted in a collaborative agreement between NRC and a small Canadian biotechnology company.
- New Cancer Therapies: NRC expertise in molecular imaging and animal models of brain tumours was applied to evaluate novel drug entities to deliver chemotherapeutic treatment to brain tumours, in collaboration with a small Canadian biotechnology company. After successfully demonstrating brain tumour targeting in pre-clinical models, the project entered phase I/II clinical trials for the most malignant of brain tumours in late 2007.

Less invasive breast cancer diagnosis – Expected Results 3, 5, 7. NRC-IBD continued development of non-invasive examination techniques using MRI technology. The Institute continued to collaborate at the local, national and international levels with leading researchers, academics and industry participants. During the reporting period, significant progress was made in testing specialized MRI spectroscopy techniques, developing analysis protocols for dynamic-contrasted MR images and developing a tool to quantify breast lump borders. Development of a new clinical protocol commenced, in collaboration with a breast radiologist and a full *in vivo* breast cancer patient study was initiated. This study will continue throughout next year.

Neurochip for drug screening and testing – Expected Results 2, 5. NRC scientists pioneered the development of a neurochip - a complex interface of living neurons or brain tissue with patterned materials and multi-electrode arrays that can potentially be used in drug screening and diagnostic testing. NRC entered advanced discussions with a wide range of potential users of this technology, including academic research laboratories and industrial partners, to prove its efficacy for the study of neurological diseases and the screening of novel pharmaceutical candidates.

Reveal the secrets of brain adaptation and regeneration – Expected Results 3, 5. NRC scientists discovered molecules that could help reduce the burden of Alzheimer's disease or enhance brain recovery (angiogenesis-modulating peptides) after stroke-induced damage. NRC-IBS continued to develop novel peptides and molecules for early detection or treatment of Alzheimer's disease, including executing an agreement with a mid-sized Canadian biotechnology company to evaluate new treatments for preventing neuronal loss and alleviating cognitive decline. NRC-IBS and NRC-IMI worked to develop novel advanced materials for tissue engineering for neurovascular repair. The research led to joint intellectual property disclosures, expected to drive the development of new biomaterials engineered to mimic natural tissues and accelerate wound healing, tissue regeneration and repair.

Information and communications technologies

The following highlights progress on information and communications technology with potential applications within sectors that have economic or social benefits for Canada.

Reduce industry risks and costs of working on next generation information and communications technology – Expected Results 1, 2, 3. Globally, information and communications technology development continues at a break-neck pace. The Institute for Microstructural Sciences (NRC-IMS) continued the development of functional materials and quantum devices to fuel the information revolution of the next decade. NRC-IMS is making significant advances in the development of nanomaterials and quantum devices that will help deliver solutions to diverse application areas such as biosensors, chemical sensing and quantum computing. NRC-IMS leads NRC's ICT Sector Strategy, pulling together competencies from across NRC to launch a demonstration project for an intelligent sensor system.

On the software side, the Institute for Information Technology (NRC-IIT) continued its development of technologies that facilitate the extraction of knowledge from data, enable people oriented systems and advance e-business protocols. In 2007, discoveries from the Social Networking Applied to Privacy project, led to thirteen peer-reviewed papers, nine invited research presentations and two keynote presentations, as well as a collaborative agreement with the Children's Hospital of Eastern Ontario (CHEO) and the University of Ottawa to apply private data discovery to computer files for enhanced security.

NRC-IIT's Language Technologies Group, which is part of the Language Technologies Research Centre, continued to focus on developing new technologies related to translation, multilingual content management, language training and speech processing. The ongoing PORTAGE project remained a key activity. The PORTAGE technology underwent a number of improvements during the reporting period, refining its translation capabilities and increasing its speed. The PORTAGE technology was the basis of eight publications and generated eight commercial licences during the year.

Fostering S&T horizontal and multi-disciplinary partnerships with other federal government departments, universities and Canadian industry

Contributions to inter-departmental efforts to support the federal S&T Strategy – Expected Results 1, 2. NRC is actively involved in the interdepartmental effort to implement the new federal S&T Strategy. NRC participates on the ADM Committee on S&T, which is the whole-of-government coordinating committee for the federal S&T community and has been charged with overseeing implementation of the new S&T Strategy and monitoring progress. NRC also has membership on the Director General Sub-Committee on S&T Strategy Implementation (DGSI) and most of the 11 working groups mandated to address specific strategy commitments. NRC is making good progress in implementing a plan developed with the Natural Sciences and Engineering Research Council (NSERC) and the Business Development Bank of Canada (BDC) to deliver upon a specific commitment of the federal S&T Strategy—the alignment of these three organizations' programs and activities. One of the R&D related initiatives was the launch of a joint nanotechnology call for proposals in energy, environment and ICT; and commencement of a round of provincial consultations to better align programs (four provinces visited so far).

The NINT — a NRC, University of Alberta, and Government of Alberta partnership— combines the strengths of a federal laboratory and a university to position Canada at the forefront of nano-scale discoveries that are expected to generate significant benefits in such areas as health and the environment – Expected Results 1, 3, 5. NINT continued to build strong links with industry. This year marked the opening of NINT's Innovation Centre with the signing of the first 6 industrial tenants and occupancy of over 20% of the available space. This was the culmination of extensive space improvements and development of policies for occupation and operation that includes the option for tenants to use NINT equipment, processes and procedures to assist in their daily operations. In concert with the opening came the launch of six collaborative projects with Xerox Canada. This is the first time that Xerox has engaged an outside partner in their core research objectives, an indication of NRC's standing as a leader in this area. The projects will explore materials design, materials characterization and modeling and simulation.

Integrated nanotechnology research to promote and advance innovation – Expected Results 1, 2, 3. Nanotechnology is an emerging research domain that cuts across a number of sectors. NRC-Nano, a cross-NRC initiative, was announced in June 2007 to increase the integration of nanotechnology expertise across NRC, as well as facilitate collaboration with external partners such as other government departments, universities, industry and international research centres.

NRC's nanotechnology research is targeted at three main application areas that directly impact Canadian competitiveness: new materials and coatings; quantum devices for next generation computing and communications; and novel nanostructure devices for photonic, sensing and biological applications. This research spans twelve NRC research institutes and combines a spectrum of competencies ranging from fundamental understanding of the properties of nanostructures, through manufacturing of nanomaterials and nanodevices, to collaborative efforts aimed at applications in aerospace, construction, communication and health related industries. For example, in the construction sector, NRC continued its development of novel materials to increase the service-life of concrete and establish new approaches to nano-engineering concrete structures. It developed new material formulations containing nano-based cement products to control the release of chemical admixtures within concrete. A patent was published and discussions for scaling production to allow testing with concrete are underway with a major private sector enterprise.

Two funding competitions were launched during the reporting period. The first supported three multidisciplinary research projects in the priority areas of therapeutics and diagnostics, nanoscale metrology and nanomaterials for solar energy applications. The second competition is a joint NRC-NSERC-BDC initiative to fund five projects ($5 million per year) in priority areas as part of the federal S&T strategy policy commitment to have existing organizations work effectively together to support the commercialization of research in Canada. The winning projects will develop semiconductor nano-composite materials, photon sources for quantum information processing, polyester nanocomposites and instrumentation for the physical characterization of nano-aerosols, for targeted impacts in the areas of energy, construction and ICT. A joint NRC, Natural Sciences and Engineering Research Council of Canada (NSERC) and Business Development Bank Canada (BDC) project on Polyester Nanocomposites for Greener Transportation, Construction and Packaging was initiated to develop advanced approaches to cost-effective integration of nano-sized reinforcements and to transfer improved manufacturing technology to Canadian industry. In

2007-08, this joint initiative also launched a series of consultations across Canada to better align the programs of organizations with a stake in increasing commercialization outcomes.

Worked with partners in industry and academia to enable leading-edge research – Expected Results 2, 4, 7. In keeping with the federal S&T Strategy's core principle - fostering partnerships - NRC promoted partnerships with business, academic, and public sectors to accelerate the pace of discovery and commercialization in Canada. The Canadian Neutron Beam Centre (CNBC), part of NRC-SIMS, enables neutron beam experiments to be undertaken on behalf of universities, industry and government researchers across Canada and internationally. In 2007-08, CNBC applied new neutron beam methods to soft materials and nanostructures and employed a new specialized spectrometer to study new hydrogen storage materials for clean energy. Collaboration between CNBC and NINT/University of Alberta produced direct results in identifying nano-structured magnesium-aluminium hydrides as promising candidates for hydrogen storage in automotive applications, effectively exploiting NRC's new capability for neutron analysis of nano-structured thin film structures.

In 2007-08, the McGill University Health Centre (MUHC) moved two of its affiliated research groups to NRC-BRI to take advantage of both its clinical research and the research and development conducted at NRC-BRI. This collaboration has funnelled external funding to support the valuation and transfer process; identify and prioritize the best potential innovations from both NRC-BRI and MUHC; offer project management for selected technologies; incubate and accelerate the development of technologies; and facilitate the transfer of technologies to the private sector or create spin-off companies to exploit such IP. Specifically, the two organizations continued to work on joint projects related to structural biology and virtual screening, as well as setting up a joint medicinal chemistry laboratory on NRC premises.

NRC-IBS was established as the lead in a multi-stakeholder initiative in molecular imaging for cardiovascular and brain pathologies, involving NRC-IBD, the NRC Steacie Institute for Molecular Sciences (NRC-SIMS), NRC-BRI, the NRC Institute for National Measurement Standards (NRC-INMS), NRC-IMI, the University of Calgary, the University of Victoria, McGill University and a small Canadian biotechnology company. An initiative to develop bioactives from natural products for human health applications was established by the NRC Institute for Marine Biosciences (NRC-IMB), the NRC Plant Biotechnology Institute (NRC-PBI), NRC-INH and NRC-IBS.

NRC-PBI identified a novel component of canola seed oil, which could contribute to control of human cholesterol levels. NRC-PBI and NRC-INH continued to work together to test the pharmaceutical effect of canola seed oil with enhanced levels of this component, on the treatment of blood total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol and triacylglycerides.

Canola product development is an $11 billion Canadian industry. NRC-PBI and Agriculture and Agri-Food Canada produced the world's largest Brassica Expressed Sequence Tag (EST) collection, which contributed to a repository of 437,000 Brassica ESTs that facilitated the design and construction of a high-density Brassica 94,000 feature CombiMatrix microarray. This high-density array will assist in targeting research on developmental processes that control seed growth and size and the metabolic processes that control oil synthesis.

Leveraging collaborations with federal science-based departments and agencies to support National Security – Expected Results 3, 5. With Chemical, Biological, Radiological, and Nuclear (CBRN) Research and Technology Initiative (CRTI) funding, NRC-INMS collaborated with the

Canadian Food Inspection Agency, Defence Research and Development Canada and Ionalytics Corporation to develop analytical methodologies for the rapid and highly sensitive detection of chemical warfare agents, toxic agrochemicals and toxins. In addition, a methodology for detection of trace levels of biotoxins within a variety of food matrices was developed. These methodologies have improved Canada's ability to respond to chemical related threats by decreasing the analysis time from hours to minutes and improving the detection power by an order of magnitude.

The NRC Centre for Surface Transportation Technology worked closely with the Department of National Defence (DND) to provide engineering design and prototyping services for the integration of a full communications suite and electronics counter-measures protection. The three-vehicle system is critical for proving and route clearing potentially dangerous vehicle throughways and thus keeping Canada's soldiers safe. Detailed knowledge of DND's Light Armoured Vehicle designs enabled NRC to design and deliver a number of Electronic Warfare equipped vehicles with new, complex electronic sensor and on-board processing capabilities that detect hostile enemy electronic signals.

NRC-IRC collaborated with the Royal Canadian Mounted Police (RCMP) and Public Works and Government Services Canada (PWGSC) on several projects concerning the design and assessment of the speech security of meeting rooms, primarily to determine whether eavesdroppers could hear or understand speech from an adjacent meeting room. The work incorporated both physical measurements of building properties and subjective assessments of speech intelligibility into an accurate rating system. To date, measurement procedures have been developed, building design procedures prepared for preconstruction consideration and a speech security guide written for the practitioner audience. Work is continuing on a new American Society for Testing and Materials (ASTM) standard for measurement, updating the PWGSC Speech Security Best Practices Guide and the development of a quick measurement procedure for use during building construction or renovation.

Support Canada's long-term competitiveness through the adoption and mutual recognition of international standards – Expected Results 1, 2, 6, 7. Competing in the global marketplace continues to be increasingly important for Canada. NRC-INMS is Canada's National Metrology Institute (NMI), determining standards and methods of measurement that impact directly on the ability of Canadian firms to trade internationally. In 2007-08, the Institute continued to work internationally, representing Canada in metrology organizations such as Comite international des poids et mesures (CIPM) and the Inter-American Metrology System (SIM). Institute staff participated in 35 CIPM Key Comparisons, which intended to demonstrate the equivalence of separate national measurement standards, ultimately reducing non-tariff trade barriers. Staff also participated on ten CIPM international Consultative Committees (CCs), that guide the development of global measurement standards and oversee international comparisons amongst member organizations.

NRC-INMS analyzed, from a Canadian perspective, an international study on measurement needs in a variety of sectors that documented over 700 innovation impeding measurement issues, as identified by industry. The Institute initiated preparation of a proposal to renew Canada's measurement innovation infrastructure, based on interviews with stakeholders across industry and NRC. Under the NRC-Nano initiative, funding was received to launch a project on metrology at the

nanoscale, which was identified within the international study as a sector requiring new fundamental measurement science.

Leverage "Big Science" partnerships – Expected Results 3, 4, 7. Astronomy is "Big Science" and the leverage of international partnerships opens large and challenging projects to Canadian industry. In 2007-08, the NRC Herzberg Institute of Astrophysics (NRC-HIA) actively sought industrial participation in its projects and facilitated their engagement in other projects and related business ventures that make use of NRC technical and scientific expertise. Notably, Nanowave Technologies of Etobicoke, Ontario licensed a component of the Band 3 receivers, developed by NRC for the Atacama Large Millimetre Array (ALMA) , manufacturing the 300 amplifiers needed for ALMA and marketing the technology globally to universities, research labs and semiconductor companies to be used in telecommunication systems, solid state physics research, materials research and low temperature physics research. The French Atomic Energy Commission has already purchased two amplifiers for its advanced nanomaterials research, as has the California-based Combined Array for Research in Millimeter-wave Astronomy.

Facilitate the implementation of Canada's Long Range Plan for Astronomy and Astrophysics (LRP) – Expected Results 4, 7. NRC-HIA executed NRC's mandate to "operate and administer any astronomical observatories established or maintained by the Government of Canada." This included activities at telescopes in Victoria and Penticton, as well international facilities including the Canada-France-Hawaii Telescope (CFHT), the James Clerk Maxwell Telescope (JCMT) and the Gemini Telescopes in Hawaii and Chile. NRC-HIA is a key contributor to Canada's Long Range Plan for Astronomy and Astrophysics (LRP), participating in key international astronomy projects. In 2007-08, NRC-HIA continued to participate in construction of ALMA and prepared the Thirty Metre Telescope (TMT) Construction Proposal. A prototype 10m composite antenna was manufactured in-house by an NRC-HIA team for the Square Kilometre Array (SKA), attracting considerable international attention as a potential solution to providing the international SKA with low cost, high-performance collecting area. Notable research achievements included the analysis of polarized radio emission from 1200 square degrees of the Milky Way. This is an important step towards understanding the role of magnetic fields in the Milky Way and their influence on the processes of star birth and death. As part of the Institute's outreach program, the visitor centre in Victoria attracted about 10,000 Canadian schoolchildren and a comparable number of adults.

Program Activity: Technology and Industry Support

This program activity includes dissemination of scientific, technical and medical information; provision of innovation assistance and engineering and technology-based facilities; contributions to the commercialization process; intellectual property management; new company creation and strategic partnerships for Canadian SMEs, NRC institutes, the public and other government research organizations.

Financial Resources ($ millions)		
Planned	**Total Authorities**	**Actual**
219.3	229.4	221.6

Human Resources (FTEs)		
Planned	**Actual**	**Difference**
884	1,022	(138)

Performance Highlights

Performance Indicators (as identified in the 2007-08 RPP)	**Results**
New firm formation (incubating firms and co-locating firms)	– 14.8% increase in incubating firms – 140 incubating firms
Investment attracted to the cluster	– Over $155 million leveraged by NRC from the private and public sectors
Technology transfer	– 98 licences issued
Knowledge dissemination	– Technical, research and business assistance to 7,645 Canadian SMEs – Over 2,900 CTI services provided including user assistance, quick references, information searches, information reports, CTI briefs, scientific, technical and medical alerts, training and presentations
Highly-qualified personnel to Canada	– Increased the number of graduate placements – 675 graduates including 331 new graduates provided with the opportunity to work with 454 SMEs across Canada
Client success	– Firms exhibited an 11% increase in sales and a 14% increase in employment for each 1% increase in both contribution agreement funding and the supply of advisory services – 77% of SME clients indicated that NRC-IRAP "allowed (the) firm's expansion"; with 60% stating that the impact was "moderate" to "large" – 75% of SMEs indicated that the Program "increased (the) company's net worth"; with 53% identifying that the impact was "moderate" to "large" – Client-firms average growth in sales 28%, employment 30% and assets 15%
Economic, social and environmental impact	– Between 2002 and 2007, the total wealth creation benefits of the Program were in the range of $2.3 and $6.5 billion.

Canada's private sector is dominated by SMEs, of which 98% have fewer than 100 employees. Within this context, Canadian SMEs often lack the capacity to invest in innovation to take full advantage of the outsourcing and off shoring realities of globalization and realize the opportunity that would make them key players internationally. Clusters are broadly based community partnerships that focus on achieving competitiveness for Canadian industry and, as such, are an appropriate mechanism to encourage SMEs to invest together and share risks in pre-competitive R&D.

Nations around the world have recognized the central role of science and technology in addressing the challenges to competitiveness and productivity caused by the advent of globalization. Many countries have recognized the importance and potential of technology clusters. Business, academia and governments form partnerships. Typically, the partners jointly develop a technology roadmap to identify critical research and technology domains important to the community. This is the basis for coordinated and integrated action.

A cluster's lifecycle can be broken down into two phases. Phase 1 - the first five years - focuses on augmenting the research and innovation capacity in communities. The second phase focuses on attracting additional private sector partners, a more comprehensive integration of community players, the operation of infrastructure and technology transfer and commercialization.

NRC's Technology Clusters have encouraged research partnerships between federal, provincial, and municipal governments, industry, and the higher-education sector. Technology Clusters are accelerating the commercialization of new technologies produced by small and medium-sized firms and are building regional S&T capacity in key sectors and industries across Canada, including ocean technologies (St. John's, Newfoundland and Labrador), aluminium technologies (Saguenay–Lac-St-Jean, Quebec) and fuel cells and hydrogen technologies (Vancouver, British Columbia).

The Government of Canada has injected staggered investments of $554 million in NRC's 11 cluster initiatives since 1999-2000. All of NRC's technology cluster initiatives have received two phases of funding from the Government of Canada. Table 2-1 provides details on the financial resource allocations for the second phase funding cycles to date.

Table 2-1: Allocation of Resources for NRC Technology Cluster Development

Location	Focus	Resources
2005-06 to 2009-10		
Halifax, NS	Life sciences (NRC-IMB and NRC-IBD)	$19.5 million
Fredericton and Moncton, NB	Information technology and e-Business	$48.0 million
St. John's, NL	Ocean technology	$16.0 million
Atlantic Canada	Coordination, administration, special studies, innovation assistance, S&T knowledge/information dissemination	$26.5 million
2007-08 to 2009-10		
Saguenay-Lac-Saint-Jean, QC	Aluminium transformation	25.4 million[1,2]
Ottawa, ON	Photonics	$21.1 million
Winnipeg, MB	Biomedical technologies	$4.0 million
Saskatoon, SK	Plants for health and wellness	$3.2 million
Edmonton, AB	Nanotechnology	$34.5 million[3]
Vancouver, BC	Fuel cell and hydrogen technologies	$11.5 million
2008-09 to 2009-10		
Charlottetown, PE	Nutrisciences and health	$8.0 million
Regina, SK	Sustainable infrastructure	$4.0 million

[1] An additional $5.0 million received in 2001-02.

[2] Canada Economic Development for the Quebec regions contributed $27.0 million to this initiative in 2001-02.

[3] The Province of Alberta also contributed $60.0 million over the period 2003-04 to 2007-08.

Delivering on Expected Results

For NRC, conducting world-class research is only part of the journey towards Canadian success within the domestic and global marketplace. NRC is also the bridge that connects industry and key innovation players to this leading research and IP, supporting the development and commercialization of new technology for Canadian firms. NRC programs support a range of industry players, from start-ups and incubating firms to established companies that already compete globally. NRC fosters all three distinct Canadian S&T advantages: an Entrepreneurial

Advantage, a Knowledge Advantage, and a People Advantage. Dissemination of scientific and technical innovations (creating a Knowledge Advantage) to Canada's industrial, research, and academic communities (creating a People Advantage), ultimately leads to enhanced Canadian economic activity through commercialization of new technologies (creating an Entrepreneurial Advantage). The expected results of this program activity, as outlined in the NRC 2007-08 Report on Plans and Priorities were:

Expected Results:

1. Contribution to the federal S&T Strategy and initiatives
2. Advancement of new technology companies
3. Access to new technologies for Canadian companies through patents and licensing
4. Enhanced innovation capacity of firms
5. Improved dissemination of knowledge
6. Support to Canadian industry

Achievements against the expected results are highlighted below. The results are organized in terms of contributions to the three advantages of the federal S&T Strategy.

Knowledge Advantage

Engage and link community groups through horizontal support (NRC-IRAP and NRC-CISTI) – Expected Results 1, 2, 4, 6. In 2007-08, NRC-IRAP continued to engage and link regional groups to develop further the technical, financial and business networks vital to cluster development and translate more research into commercial outcomes. In 2007-08, NRC-IRAP contributed $1.55 million of NRC cluster funding to 45 different innovation support organizations within six NRC technology clusters, which ensured that SMEs had access to needed pre-commercialization support. This included NRC-IRAP support to industry-driven organizations that promoted regional technology clusters, such as Newfoundland's OceansAdvance, PEI's BioAllliance, Saskatchewan's Biomedical Commercialization Canada and Manitoba's BioAccess Commercialization Centre.

A study conducted in British Columbia indicated that when compared to non NRC-IRAP clients, the Program's client firm revenues and employment growth were higher by more than 20% - 30%. Furthermore, payroll grew faster for NRC-IRAP clients than non-clients by about 25%. Shareholder equity growth of clients outperformed that of non-clients by a factor of almost seven.

NRC-IRAP also directly contributed to the growth of 30 individual firms within the NRC clusters by providing a total of $1.28 million non-repayable contributions, on a cost-shared basis for their respective technological research projects. NRC-IRAP fully expended its NRC cluster funding, leveraging an additional $15 million of R&D expenditure within seven technology clusters in which NRC participates.

During 2007-08, NRC-CISTI's Information Intelligence Services program offered a range of products and services to NRC-IRAP industrial technology advisors and their SME clients through a network of specialists in 17 communities from coast to coast. NRC-CISTI staff, who are co-located in 9 regional technology clusters, provided scientific, technical, medical and business-related information, search and analysis services to NRC researchers, companies located in industrial partnership facilities and external clients within the region.

In addition, NRC-CISTI provided regional clients with more than just access to scientific, technical and medical information, as it provided answers supporting business decisions. NRC-CISTI provided NRC-IRAP industrial technology advisors with competitive technical intelligence (CTI) that contributed to successful regional client SME commercialization outcomes. CTI has demonstrably led to reduced risk of NRC-IRAP investments and commercial success for SMEs. The information and analyzes helped to establish the technical feasibility and market potential of a product, strengthened business cases and identified potential partners. Impact statements collected from participants in 2007-08 include:

- "Without the CTI Brief, [NRC-]IRAP would not have invested in the technology."
- "The SME followed up on [NRC-]CISTI alternative product suggestions by looking at other applications of the technology."
- "[NRC-]CISTI information helped to get the company to move in a new direction."

Enhance collaborative partnerships – Expected Results 2, 5, 6. In 2007-08, in line with the federal S&T Strategy, NRC increased its efforts to develop collaborations and partnerships with industry and engage stakeholders to contribute to the development of clusters across Canada and increase the pace of discovery and commercialization. NRC-IRAP is a key integrator and attractor and brings synergy to the clusters. NRC-IRAP's approach to building and supporting technology clusters differs from and builds on, its usual method of reacting to a specific firm need. The cluster approach is community, not firm-based; proactive, not reactive; benefits are intended to accrue to all players within the cluster supply chain, not just one firm; and support is targeted to the specific needs of the cluster's stage of development, not on one organization's readiness. As one example, in 2007-08, NRC-IRAP supported New Brunswick SMEs in the fields of knowledge management and semantic web techniques, helping them collaborate on proposals for national tenders to attract business opportunities flowing from the rest of Canada. Additionally, over the last three years, numerous small contracts in the areas of website creation, international website standards analysis and graphic design have led to various collaborations between members of this network. The network enabled members to become better acquainted with one another and to develop an interest in collaborating through their own initiatives. This year members of the Centre international de développement de l'inforoute en francais (CIDIF) network identified a major opportunity, prepared a joint proposal and were awarded a contract from Canadian Heritage for a project titled "Knock on Wood" worth approximately $400,000.

Focus on cluster growth to create critical mass and build community innovation capacity – Expected Results 1, 2, 3, 4, 5, 6. The successful growth of dynamic technology clusters will not be the result of a single organization – clustering is a collaborative and iterative process that requires active commitment from all stakeholders. NRC contributed to the growth of Canadian technology clusters by:

- Bringing the leadership needed to gather stakeholders together to define a collective vision
- Building trust within a cluster by fostering networking and collaborative R&D between firms
- Motivating other levels of government to share in the vision
- Maximizing the use of scarce resources by leveraging funds (e.g., investing in much-needed scientific infrastructure, sharing experts between universities and NRC labs)

- Establishing a focal point for the cluster by acting as a neutral ground for the private sector to meet and attract in outside investment
- Identifying bottlenecks to SME growth and creating targeted solutions for technology transfer and commercialization
- Connecting firms and researchers across the country and around the world through its national mandate and international reputation

The following are examples of cluster initiatives that NRC moved forward in 2007-08:

- **Nanotechnology (Alberta)** – Nanotechnologies, involving scientific discovery at the nanoscale, are expected to revolutionize how people work and live, with the potential to resolve a number of energy and environmental challenges. NRC is helping Canada stake its place in nanotechnology through its role in NINT, a multi-disciplinary institution funded by the federal government, the University of Alberta and the Government of Alberta. NINT's goal is to deliver nanotechnology applications in areas that can create and grow a sustained cluster of high technology industries that deliver social and economic benefits to Alberta and to Canada. These goals are aligned with the federal S&T Strategy. The focus of NINT's research is the integration of nano-scale devices and materials into complex nanosystems that are connected to the outside world. During the reporting period, patents were filed for nanostructured high surface area electrodes and for porous thin-filmed optical devices, both technologies that have applications in energy devices and flat-panel displays. Licensing discussions for technology transfer to the private sector are ongoing.

  NINT continued to work with nanoMEMS Edmonton and Tec Edmonton to bring together local proponents and accelerate the growth of nanotechnology by attracting firms and investment to the region. The NINT Innovation Centre opened in 2007-08, after the completion of extensive space improvements and development of private sector occupation policies. Six industrial tenants were signed, occupying over 20% of the available space.

- **Biosciences (Prince Edward Island and Saskatchewan)** – NRC-INH continued working with the PEI biosciences cluster to support its development. NRC-INH played a key role, through its IPF to attract six new ventures to the cluster, with two others currently competing for the final IPF spaces. In 2007-08, NRC-INH had nine active collaborative research agreements with cluster members totalling $4.9 million in value and 13 fee-for-service agreements generating more than $350,000 in revenue with industry partners. NRC-INH assisted these private sector firms to improve their intellectual property portfolios, with one firm filing for patent protection jointly with NRC. During 2007-08, NRC-PBI made significant investments in research and development infrastructure to support the growth of the Plant Biotechnology Cluster in Saskatoon. Specifically, it acquired instrumentation to improve sensitivity, increase the range and reduce the analysis time for hormone profiling. It also purchased a state of the art DNA Sequencer (one of only three in Canada) to enable cluster participants to resolve hundreds of DNA sequences in one run. Research, development and commercialization activities in these clusters focused on the federal S&T Strategy research priority – health and related life sciences and technologies.

Build on successes from NRC's Atlantic Initiatives, Phase I – Expected Results 1, 2, 3, 4, 5, 6. NRC continued to nurture the growth of its Atlantic cluster initiatives by maintaining leading-edge research capabilities (infrastructure and human capital), developing research collaborations with cluster firms, fostering increased networking and knowledge-sharing and supporting the involvement of firms and other partners in the cluster.

- **Information Technology (New Brunswick) –** NRC-IIT continued to be a key provider of innovation infrastructure and programs, to bridge R&D to innovative New Brunswick products. Exemplifying S&T collaboration and a results-based approach, NRC-IIT jointly filed a patent with the Atlantic Cancer Research Institute on the biomarker for prostate cancer. The technology enables the cost effective and highly accurate sorting and analysis of gene-expression data and won the Canadian Information Productivity Awards Gold Award for Innovation in November 2007. Complementary development for identifying colon cancer biomarkers was completed and a patent is currently pending for this technology. Research, development and commercialization activities in this cluster focused on the federal S&T Strategy research priority – information and communications technologies.

- **Ocean Technologies (Newfoundland and Labrador) –** NRC-IOT continued to lead the ocean technology cluster-building process by working with industry, government and academia. Industry participation in the Cluster grew steadily throughout the year. Companies in the Cluster now number more than 50, with an increase of 15% over the previous year. Those companies have spent about $17 million on R&D activities during the reporting period and generated some $259 million in total sales revenue. Building on Atlantic Investment Partnership (AIP) funding, NRC-IOT opened the Ocean Technology Enterprise Centre (OTEC), which operated at full capacity during the reporting period. OceansAdvance, the public-private joint venture created to drive cluster development, completed a strategic planning exercise, resulting in the development of a 10-year ocean technology growth strategy. OceansAdvance, NRC and the Provincial Government also released the inaugural Ocean Technology Cluster Tech-Knowledge Map during the year. Research, development and commercialization activities in this cluster focused on the federal S&T Strategy research priority – natural resources and energy.

- **Life Sciences (Nova Scotia) –** The Life Sciences cluster in Nova Scotia is a well-established and diverse community of private sector companies, academic institutions, government departments and industry organizations. NRC-IMB established its role within the cluster as a direct research and development support mechanism for industry. The NRC-IMB IPF provided fee-for-service testing, technical instrumentation training, access to laboratory equipment and networking opportunities for cluster members during the reporting period. Currently IMB has 29 active agreements with partners, valued at more than $12 million. The NRC-IBD Biomedical Research Laboratory, located at IWK Hospital in Halifax, held its grand opening in the fall of 2007 and is ready for collaborative efforts with partners such as Dalhousie University. Research, development and commercialization activities in this cluster focused on the federal S&T Strategy research priority – health and related life sciences and technologies.

Build on the success of the Information Intelligence Services program – Expected Results 1, 5, 6. NRC-IRAP and NRC-CISTI continued to develop capacity (a People Advantage) to provide CTI and information analysis services in order to provide best-in-class strategic advice to cluster

participants and optimize NRC investments. NRC-CISTI's Information Intelligence Services offered a range of products and services to R&D clients across the country, as highly-trained technical business analysts prepared reports to facilitate client decisions on technology investments and research directions. NRC-IRAP developed in-house capabilities to capture CTI. ITAs capitalized on CTI to support their capability to provide advisory services to clients and to help them make the best possible investments with client firms. Client satisfaction is high, with a recent survey of Atlantic Region NRC-IRAP industrial technology advisors rating the CTI service at 4.6 out of 5.

Offer Scientific and Technical information and intelligence – a Knowledge Advantage to Canadian industry – Expected Results 1, 5, 6. NRC-CISTI is Canada's national science library and one of the largest comprehensive sources of scientific, technical and medical information in North America. Through its publishing arm, NRC Research Press, NRC-CISTI is also Canada's foremost scientific publisher. NRC-CISTI's information specialists, technical business analysts and technical information analysts provide value-added information services and competitive technical intelligence reports to NRC-IRAP SMEs, NRC researchers and other clients through the NRC Information Centers co-located with NRC institutes across Canada.

In 2007-08, NRC-CISTI continued to provide Canada's research and innovation community with tools and services for accelerated discovery, innovation and commercialization of research. It created value for Canadians by improving the flow of scientific information in three ways:

NRC-IBD, along with NRC partners NRC-IRAP and NRC-CISTI worked directly with SMEs, bringing research strengths and business expertise to bear on market-driven challenges and opportunities and enhancing their competitiveness. Together, the three Institutes produced the award-winning Medical Technology Watch newsletter, which enhances awareness in the medical devices sector.

- collaborating with partners to develop a networked cyber-infrastructure to provide enhanced access to the world's electronic scientific, technical and medical research information and data, encompassing new and existing open access content repositories and intelligent search and analysis applications;
- developing and supporting Canada's electronic scientific publishing infrastructure by integrating online peer review, editing and publishing tools and Web 2.0 features to enable dissemination and discovery of Canadian research worldwide; and
- expanding services to support commercialization and SMEs, such as competitive technical intelligence and patent information analysis – "actionable" information.

NRC-CISTI's National Science Library document delivery service filled 485,000 document orders in 2007-08, half from Canadians. Core clients were in the academic, health, government and industry sectors, with 29 clients from amongst the top 60 R&D spenders in Canada. NRC-CISTI continued to innovate, launching a suite of services under the *Discover* banner to give Canadians faster and easier access to 15 million articles in the collection, which is being strengthened in the areas of health, the nine key R&D sectors identified in the NRC strategy and resources to support commercialization of research. The NRC Virtual Library provided NRC institute researchers with desktop access to licensed electronic journals and databases. This past year NRC-CISTI significantly expanded NRC researcher access to scientific, technical and medical research publications by subscribing to Scopus, a searchable database of article abstracts with citations from 15,000 peer-reviewed journals as well as conference proceedings, patents and other content

from around the world. NRC professionals made 258,000 NRC Virtual Library site visits in 2007-08, an increase of 12.5% over the previous year.

In 2007-08, NRC provided funding for the development of the NRC Publications Archives, a NRC-CISTI-hosted open access repository of research papers and articles authored by researchers across NRC, who collectively produce more than 3,500 articles per year. Free access to NRC publications increased the visibility and impact of federally-funded research in Canada and around the world. CISTI Lab, an open virtual platform for demonstrating and evaluating prototype knowledge discovery applications such as text mining, visualization tools and research paper citation analysis, was implemented in 2007.

The NRC Research Press publishes 16 scientific journals with 13,900 subscribers in 101 countries. In 2007-08, 6,192 authors were published in these respected peer-reviewed journals. In addition, the Press publishes 15 journals on behalf of client scholarly societies. The 31 journals combined represent 40% of the scientific, technical and medical journals published in Canada. Of the 30 editors, 28 are Canadians with a Ph.D. level education; 9 editorial offices are co-located at Canadian universities, enhancing the global reputations of these professors and their faculties and universities. In addition, the Press published 5 books in 2007-08, with another 9 in production, most available in both print and electronic formats.

The Press leads in Canadian electronic publishing innovation: its 16 journals are published in electronic format, 14 of which now include multimedia publishing capacity and reference linking. The project to digitize journal back issues – a million pages - was completed in 2007 making decades of Canadian research only a few clicks away. A project to digitize more than 75 years of *The Forestry Chronicles* back issues was also completed. The federal Depository Services Program funds free electronic access to 15 Research Press journals by Canadians. About 600,000 article downloads in 2007 validates the importance of this scientific resource. The Press continues to explore open access business models, launching the fee-based *Open Article* option in January 2008 that offers authors the choice of making their articles available free upon publication.

The Information Intelligence Services program specialists locate, filter and analyze information, meeting a growing and crucial need for Canadian entrepreneurs in an era of information overload, fast innovation and international competition. In 2007-08, there were 19,500 literature searches, patent analyzes, reports and other deliverables supplied to NRC institute and cluster clients and an additional 2,900 deliverables to IRAP ITAs. In 2007-08, the program expanded to provide services on a cost-recovery basis. For example, these services are contracted to the Centre québécois de valorisation des biotechnologies until 2010, the first agreement with a non-governmental organization.

People Advantage

Attracting and Retaining Highly-Skilled Workers – Expected Results 1, 4. In January 2008 the opening occurred of the Biomedical Magnetic Resonance Imaging Lab (BMRL), located in the IWK Health Centre, Halifax. This is a direct result of a thriving collaborative partnership between IWK and the National Research Council (NRC). The state-of-the-art research facilities will attract world-class researchers and physicians. Improved health outcomes will result from the sophisticated technology-driven assessment approaches used in the new lab.

Providing Work Experience to Canada's Youth – Expected Results 1, 4. The renewal of the NRC-IRAP's terms and conditions allows the NRC-IRAP to continue to deliver two federal Youth Employment Strategy (YES) initiatives. These initiatives allow graduates to gain valuable work experience and firms access to up-to-date skills and expertise. In 2007-08, there was an increase in the graduate placements with approximately 675 graduates including 331 new graduates provided with the opportunity to work with 454 SMEs across Canada ($4.99 million from Human Resources and Social Development Canada (HRSDC) and $1.15 million from NRC-IRAP).

Community Outreach – Expected Results 1, 4. In 2007-08, NRC took over the leadership of the Canadian National Marsville Program – a national science promotion initiative that involves some 3,000 grade 6-8 students from across Canada who work in teams to solve problems and develop a simulated Mars habitat. This Program is being expanded to encompass other regions, with a goal of having a site in every province and territory. NRC is also actively engaged in the Science Culture and Entrepreneurship initiative being led by NSERC and Industry Canada.

These activities are in addition to NRC's other science outreach programming including National Science and Technology Week, National Engineering Week, Sanofi-Aventis Biotalent Competition, the S&T Awareness Network and others, as well as its nation-wide distribution of hundreds of thousands of education materials to schools across Canada such as the Periodic Table of the Elements, Biotechnology fact sheets, and the Canadian Skies posters. Of note, the visitor's centre at the NRC-Herzberg Institute for Astrophysics in Victoria, British Columbia, was selected in recent years as one of the top 10 places for families to visit by the Victoria vacation guide.

Entrepreneurial Advantage

Expand network of Industrial Partnership Facilities (IPFs) – Expected Results 1, 2, 4. In support of its cluster development activities, NRC continued to develop, build and operate Industry Partnership Facilities (IPFs) across Canada. These unique facilities are workplaces for collaborative research and the incubation of new firms and NRC spin-offs. They also serve as community resources for access to mentoring, innovation financing and competitive technical intelligence for new enterprises providing an entrepreneurial and a knowledge advantage. In 2007-08, NRC had 15 IPF locations across the country with a complement of 140 incubating firms. With the addition of a new facility opening in Edmonton in 2007-08, the total space available in NRC IPFs is 30,458 square metres.

Table 2-2: NRC's Industry Partnership Facilities

	Location	Total Area (m^2)	Status	Completion Date	% occupied
1	Institute for Ocean Technology (St John's, Newfoundland)	441	in operation	2003-04	100%
2	Institute for Marine Biosciences (Halifax, Nova Scotia)	1,036	in operation	2004-05	85%
3	Institute for Information Technology (Fredericton, New Brunswick)	627	in operation	2002-03	88%
4	Biotechnology Research Institute (Montreal, Quebec)	9,800	in operation	1997-98	92%
5	Industrial Materials Institute (Boucherville, Quebec)	2,180	in operation	2003-04	61%

	Location	Total Area (m^2)	Status	Completion Date	% occupied
6	NRC Industry Partnership Facility, M-50 (Ottawa, Ontario), (shared facility with several Institutes)	1,604	in operation	1998-99	96%
7	NRC Industry Partnership Facility, M-23A (Ottawa, Ontario), (shared facility with several Institutes)	297	in operation	2004-05	63%
8	100 Sussex Industry Partnership Facility (Ottawa, Ontario), (shared facility with several Institutes)	509	in operation	2003-04	138%[1]
9	Institute for Biodiagnostics (Winnipeg, Manitoba)	1,194	in operation	2005-06	70%
10	Plant Biotechnology Institute (Saskatoon, Saskatchewan)	7,314	in operation	2002-03	100%
11	Institute for Fuel Cell Innovation (Vancouver, British Columbia)	1,209	in operation	1999-2000	95%
12	Herzberg Institute of Astrophysics (Penticton, British Columbia)[2]	141[3]	in operation	2001-02	59%
13	Institute for Nutrisciences and Health (Charlottetown, Prince Edward Island)	477	in operation	2006-07	83%
14	Institute for Aerospace Research (Montreal, Quebec)	929	in operation	2006-07	13%
15	NINT Innovation Centre (Edmonton, Alberta)	2,700	in operation	2007-08	23%
	Total	**30,458[4]**			

[1] due to increased space demands, Institute made additional space available to firms
[2] space previously designated as IPF space in Victoria has been allocated to LRP work (NRC-HIA)
[3] additional space allocated to the Okanagan Research and Innovation Centre (ORIC) (NRC-HIA)
[4] due to an addition error the total area of IPFs was reported as 30,448 m^2 in 2006-07. The correct area should have been 30,458 m^2

Develop a medium for regional delivery of national initiatives – Expected Results 1, 3, 4, 6. By establishing regional networks of clusters of firms and other community stakeholders, NRC is ensuring that its national R&D and commercialization support programs are accessible and remain regionally relevant. Overall, NRC's cluster initiatives provide benefits to Canada by providing the organization the capacity to:

- better understand the innovation needs of regions;
- engage regional industry leaders to determine how best to deliver nationally-driven services and support; and
- physically deliver regionally tailored R&D and commercialization services and support that meet the needs of private industry.

With this knowledge, NRC is able to target its efforts strategically to increase the impact of its investments and improve commercialization outcomes.

Encourage more involvement / commitment of cluster partners – Expected Results 1, 2, 3, 5. In 2007-08, NRC followed-up on the results and lessons learned from the evaluations of its cluster initiatives.

- **Medical Devices Technology (Manitoba) –** The Manitoba biomedical cluster experienced a number of impressive accomplishments over the reporting period and demonstrated the power of clusters in accelerating and improving commercialization outcomes. IMRIS, a spin-off of NRC-IBD, was successfully listed on the Toronto Stock Exchange (TSX) in November 2007 with a $40 million IPO – the largest medical device IPO in Canadian history. IMRIS continued

its strong growth, with employment of over 100 people and a market capitalization of over $120 million. Another cluster member, Intelligent Hospital Systems, also received $7.6 million of financing from BDC Venture Capital, Wellington West and Western Life Sciences Fund. Incubator capacity was established within the cluster, resulting in start-up and early stage firms migrating to a formal incubator environment. Koven technologies Inc. (an NRC-IBD IPF partner) received the CE mark, becoming approved for European sales of its in-situ vascular bypass device. Kent Imaging Inc. (an NRC-IBD spin-off), which produces a near infrared spectroscopy (NIR) device for biomedical imaging, was selected for the Minnesota Life Sciences Alley product showcase and garnered investor interest. Fermion Inc. (an NRC-IBD IPF partner), which produced a detection device, won the Business of Science Competition in October of 2007 and was showcased at the 2008 World's Best Technology in Texas.

- **Canadian Photonics Fabrication Centre (Ontario)** – This partnership among NRC, the Province of Ontario and Carleton University provides fabrication and prototyping services, as well as expertise and advice to photonics firms across the country – an example of a practical approach that fosters knowledge transfer and commercialization among different levels of government and universities. During the reporting period, the NRC Canadian Photonics Fabrication Centre (CPFC) completed updating its draft technology roadmap, identifying the materials platforms and types of devices required to align with the five sectors critical for Canada (information and communications technology, energy and lighting, biomedical and health, defence security, space and environmental). Five successful workshops on photonic sub-sectoral activities were delivered across the country, including photonics in manufacturing (Toronto), photonics in ICT (Ottawa), photonics in defence and security (Montreal), photonics in energy and environment (Edmonton) and photonics in life sciences and biotechnology (Toronto). Additionally, NRC-CPFC worked with the Canadian Photonics Consortium, engaging Canadian photonics companies to study the status and impact of photonics in Canada and its place within the international photonics community.

Integrated Industry Support that Engages Key Players – Expected Results 1, 2, 3, 4, 6. To support the Government of Canada's S&T Strategy, and in particular its commercialization priority, the NRC TIS portfolio worked closely with the NRC R&D portfolio to increase commercialization outcomes. This included technology licensing; provision of pre-commercialization assistance, mentoring and business intelligence to Canadian firms; access to vital national and international networks; knowledge dissemination and expertise; and helping companies create new products and/or new technologies. In addition, it collaborated with key partners to develop strategic initiatives to accelerate the successful competitiveness/ commercialization of new technologies. TIS also helped to fuel the growth and innovative capacity of SMEs and continued to streamline its approach to intellectual property management and the transfer of technology.

Build innovation capacity within SMEs – Expected Results 1, 4, 5. Since its inception, close to 60 years ago, NRC-IRAP has provided support to Canadian SMEs, broadening its purpose from a limited focus on technology transfer to its current strategic objective of increasing the innovative capabilities of Canadian SMEs. Today, NRC-IRAP provides comprehensive innovation assistance to technology-based SMEs in almost every industrial sector of importance to Canada's current and future economic development and contributes to the Entrepreneurial Advantage of Canadian companies. SMEs engaging in high-risk, technologically sophisticated R&D face increasingly complex challenges. NRC-IRAP supported these technology-based SMEs in growing and

becoming more competitive by focusing on: increasing the rate of growth of SMEs; expanding the number of SMEs that successfully commercialize their products, services and processes; assisting with potential international collaborations on technology development projects; and providing international opportunities to clients looking to gain knowledge to advance their R&D projects.

The 2007 NRC-IRAP Impact Evaluation report[8] stated "...NRC-IRAP client firms have experienced growth, both in real and comparative terms. Over the five year evaluation period (2002-03 to 2006-07) client firm sales grew on average by just over 28%, overall firm employment grew by 30% and company assets grew on average by 15%... By contributing to the development of research and development capacity, the overall growth of SMEs, the commercialization of new products, services and process, as well as the creation of new knowledge and intellectual property, NRC-IRAP has positively stimulated overall innovation in Canadian SMEs and in Canada as a whole."

Offer comprehensive commercialization support, including technology transfer and intellectual property management – Expected Results 1, 3, 6. During 2006-07, NRC undertook an in-depth examination of all its industry support programs, policies and practices as part of a project called Business Review. This project was launched to ensure NRC was well-equipped and well-positioned to carry out client-based activities described in NRC's Strategy, *Science at Work for Canada* and that support the federal S&T Strategy. Recommendations from the Business Review project included: working increasingly on an industry-sector basis; increasing NRC's capacity to develop industrially relevant technologies and their commercialization; and ensuring NRC's internal operations make it easier for its institutes and programs to serve clients. The recommendations also included establishment of a corporate business group.

Central Business Services – Expected Results 1, 5, 6. In early 2007, the NRC Senior Executive Committee approved the recommendations from the Business Review project, including a one-year pilot expansion of the corporate business group. The expanded corporate business group provided targeted support to NRC's key industry sectors, ensuring that their planning activities in 2007-08 received the industry sector and market focus required to address adequately client needs and opportunities. At the end of the reporting period, the pilot was deemed a success, culminating in the permanent establishment of the Central Business Support (CBS) group.

Improve NRC's Intellectual Property Management – Expected Results 1, 3, 5, 6. Guided by both a 2003 benchmarking study of best practices in IP management and the results of the Business Review project (described above), NRC continued to strengthen its IP management and increase the impact of its S&T research. This work was a priority of the pilot-project CBS group, which successfully launched a project called Disclosure Review to examine NRC's invention disclosures for both IP protection and patentability. NRC institutes utilized the results from the project to guide their research, protection and marketing strategies. Additionally, CBS offered technology assessment services and increased access to market research tools to NRC institutes. Collaborations with NRC-CISTI were initiated to assist NRC clients with market and patent examinations. Specific activities included increased focus on high value IP; increased use of technology assessments; increased market research tools and, adoption of the world's best practices and tools.

[8] http://www.nrc-cnrc.gc.ca/aboutUs/evaluation_e.html

Contributions to inter-departmental efforts to support the federal S&T Strategy – Expected Results 1, 4, 6. NRC is actively involved in the interdepartmental effort to implement the new federal S&T Strategy. NRC participates on the ADM Committee on S&T, which is the whole-of-government coordinating committee for the federal S&T community and has been charged with overseeing implementation of the new S&T Strategy and monitoring progress. NRC also has membership on the Director General Sub-Committee on S&T Strategy Implementation (DGSI) and most of the 11 working groups mandated to address specific strategy commitments; NRC is leading two of these working groups.

In terms of NRC's leadership of these two working group, NRC is making good progress in implementing a plan developed with the Natural Sciences and Engineering Research Council (NSERC) and the Business Development Bank of Canada (BDC) to deliver upon a specific commitment of the federal S&T Strategy—the alignment of these three organizations' programs and activities. Key progress to date includes: finalizing an action plan; the establishment of a governance structure with a steering committee, creation of a working group and five regional "hub" committees; co-location of staff from the three organizations; increasing awareness of each others programs; and initiation of pilot projects in shared due diligence. Work will be undertaken in 2008 to consider how the alignment exercise could be broadened to include other federal organizations.

NRC has also been co-leading with Industry Canada an interdepartmental effort to review federal intellectual property policies announced in the S&T Strategy. Two background studies, a literature review and a map of whole-of-government and organization-specific IP policies and practices, were completed in March 2008. A final report, with recommendations for addressing key issues of concern and opportunities, is expected in fall 2008.

Section III – Supplementary Information

NRC's Link to the Government of Canada Outcome Areas

Strategic Outcome: An innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support				
Program Activity	**Actual Spending 2007-08 ($ million)**			**Alignment to Government of Canada Outcome Area**
	Budgetary	**Non-budgetary**	**Total**	
Program Activity: Research and Development	549.5		549.5	An innovative and knowledge-based economy
Program Activity: Technology and Industry Support	221.6		221.6	Strong economic growth

NRC's Research and Development Program Activity contributes to an innovative and knowledge-based economy by undertaking, assisting and promoting scientific and industrial research. NRC is the federal government's primary provider of research and research facilities. It pursues cutting-edge R&D that supports the growth of Canadian industry and uncovers solutions to national challenges in health, climate change, the environment, clean energy, and other fields. NRC identifies Canada's S&T opportunities and adapts its scientific research and development activities to meet national needs and priorities.

NRC's Technology and Industry Support Program Activity contributes to strong economic growth through its industry and commercialization support. NRC provides Canadian companies with access to the program's leading-edge knowledge and technology through collaborative agreements and partnerships; and opportunities to commercialize products and services by licensing the use of NRC's patents. Leading-edge technology opens new markets to Canadian companies and provides them with a competitive advantage in the world market. A strong domestic economy benefits Canadians.

In addition, NRC contributes indirectly to the Government of Canada outcome areas: A Clean and Healthy Environment and Healthy Canadians. Environmental stewardship is driven through policy and technological capability. NRC conducts leading-edge research in alternative energy technologies, such as fuel cells and hydrogen and contributes to advanced and efficient manufacturing within the automotive and aerospace sectors. R&D activities centering on oceans and bioremediation contributed toward a sustainable healthy environment for Canadians and the entire world. NRC contributes to improving the health of Canadians through R&D activities targeted at nutraceuticals, pharmaceuticals and innovative medical diagnostics and treatment protocols. Harnessing the characteristics of plants for improving health is a growing field and NRC research is helping Canadian companies along this path.

NRC Resources

Table 3-1: Comparison of Planned to Actual Spending, incl. FTE (millions of dollars)						
Program Activity	2005-06 Actual	2006-07 Actual	2007-2008 Main[1] Estimates	2007-2008 Planned Spending	2007-2008 Total Authorities	2007-2008 Actual
Research and Development	519.1	530.0	459.5	492.3	636.4	549.9
Technology and Industry Support	215.8	212.0	212.9	220.0	229.4	221.1
Total	**734.9**	**742.0**	**672.4**	**712.3**	**865.8**	**771.1**
Total						
Less: Spending of Revenues Pursuant to section 5(1)(e) of the NRC Act	(85.2)	(55.6)		(75.4)		(96.8)
Plus: Cost of Services received without charge[2]	25.0	27.6		25.6		25.1
Net cost of Department	**674.7**	**714.0**		**662.5**		**699.4**
Full Time Equivalents (FTE)	**4,155**	**4,191**		**4,044**		**4,280**

Notes

(1) Respendable revenue and employee benefit plans are already in the Main Estimates total.

(2) Services received without charge include accommodation provided by PWGSC, the employer's share of employees' insurance premiums, Audit Services received from the OAG, Payroll services provided by PWGSC, Workers' Compensation coverage provided by Human Resources and Social Development Canada, and services received from the Department of Justice Canada (see Table 3-4).

- Due to rounding, figures may not add to total shown.

Table 3-2: Voted and Statutory Items (millions of dollars)

Vote or Statutory Item	Truncated Vote or Statutory Wording	2007-2008 Main Estimates	Planned Spending	Total Authorities	Total Actuals
	National Research Council Program				
55	Operating expenditures	365.7	395.0	445.4	**422.9**
60	Capital expenditures	41.3	47.0	47.2	**45.1**
65	Grants and contributions	144.0	145.9	152.1	**148.1**
(S)	Spending of revenues pursuant to the National Research Council Act	75.4	75.4	162.7	**96.8**
(S)	Contributions to employee benefit plans	46.2	48.9	57.7	**57.7**
(S)	Spending of proceeds from Disposal of Crown Assets			0.7	**0.7**
(S)	Collection Agency Fees			0.0	**0.0**
	Total	**672.4**	**712.3**	**865.8**	**771.1**

Notes

- Due to rounding, figures may not add to total shown.

Table 3-3: Sources of Respendable Revenue

For supplementary information on NRC's sources of respendable revenue, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

Table 3-4: Resource Requirements by Branch or Sector

For supplementary information on NRC's resources requirements by branch or sector, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

Table 3-5a: User Fees

For supplementary information on NRC's User Fees, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

Table 3-5b: External Fees

For supplementary information on NRC's Service Standards for External Fees, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

Table 3-6: Details on Project Spending

For supplementary information on NRC's Details on Project Spending, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

Table 3-7: Details on Transfer Payment Programs

For supplementary information on NRC's Details on Transfer Payment Programs, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

Table 3-8: Horizontal Initiatives

For supplementary information on NRC's Horizontal Initiatives, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

Table 3-9: Response to Parliamentary Committees and External Audits

For supplementary information on NRC's Response to Parliamentary Committees and External Audits, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

Table 3-10: Internal Audits and Evaluations

For supplementary information on NRC's Internal Audits and Evaluations, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

Table 3-11: Travel Policies

For supplementary information on NRC's Travel Policies, please visit: http://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/index-eng.asp.

FINANCIAL STATEMENT DISCUSSION AND ANALYSIS

INTRODUCTION

The following Financial Statement Discussion and Analysis (FSD&A) should be read in conjunction with the audited financial statements and accompanying notes for the National Research Council of Canada (NRC) for the fiscal year ended March 31, 2008.

The responsibility for the preparation of the FSD&A rests with the management of NRC. It has been prepared in accordance with the Public Sector Statement of Recommended Practice SORP-1.

The purpose of the FSD&A is to highlight information and provide explanations which enhance the users' understanding of NRC's financial position and results of operations, while demonstrating NRC's accountability for its resources. Additional information on NRC's performance is available in the NRC Departmental Performance Report (DPR) for 2007-08.

The FSD&A consists of two distinct segments: Highlights, and Discussion and Analysis. Please note that all financial information presented herein is denominated in Canadian dollars, unless otherwise indicated.

Special note regarding forward-looking statements

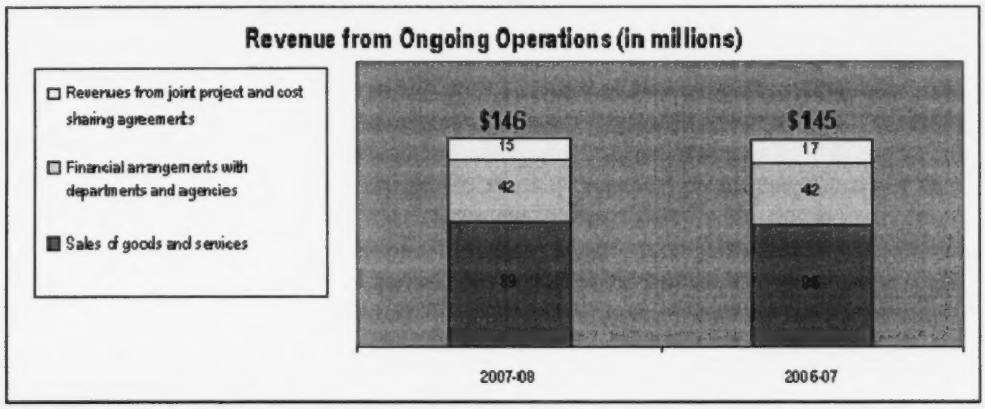
The words "estimate", "will", "intend", "should", "anticipate" and similar expressions are intended to identify forward-looking statements. These statements reflect assumptions and expectations of NRC, based on its experience and perceptions of trends and current conditions. Although NRC believes the expectations reflected in such forward-looking statements are reasonable, they may prove to be inaccurate, and consequently NRC's actual results could differ materially from expectations set out in this FSD&A. In particular, the risk factors described in the "Financial Risk and Uncertainty" section of this report could cause actual results or events to differ materially from those contemplated in forward-looking statements.

2007-2008 HIGHLIGHTS

FINANCIAL HIGHLIGHTS

STATEMENT OF OPERATIONS

Revenue: Revenue is important to NRC, not only as a means of financing its operating and capital expenditures, but also because it provides an indication of the value that NRC provides to its clients and collaborators. NRC earned total revenues of $155 million in 2007-08. Although total revenue decreased from $170 million in 2006-07, the reduction is not due to ongoing operations but rather to unusual revenue related issues. Sales of goods and services, revenue from other governments department excluding revenue adjustments related to the Technology Partnerships Canada (TPC) program, and revenue from joint project and cost sharing agreements totaled $146 million in 2007-08, as compared to $145 million in 2006-07.



Further details on revenue components are available in the Financial Analysis section.

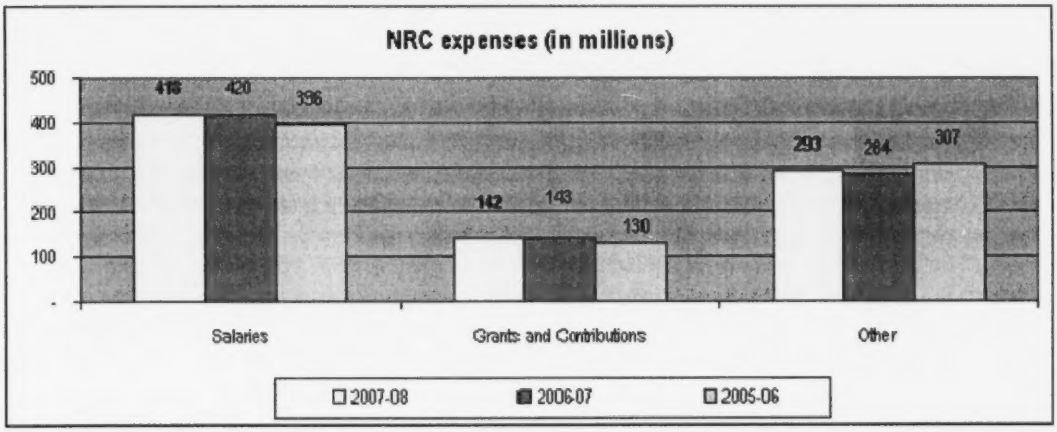
Expenses: Over the past three fiscal years, NRC's total expenses have not significantly increased. In fact, NRC has only had a 2.3% rise in expenses since 2005-06. Furthermore, NRC's major expense components have remained stable, as seen in the diagram provided below. The following two categories of expenses are most important to NRC from both a research program and cost perspective, and represent 66% of total expenses. All other significant expense variations are explained in the Financial Analysis section.

- ***Personnel:*** NRC's total expenses, as detailed in the Notes to the Financial Statements, are made up of 49% in salaries and employee future benefits. Personnel costs represent the most significant cost driver for NRC. Salaries and employee future benefits decreased to $418 million in 2007-08 from $420 million in 2006-07. Normal salary pay increases in 2007-08 are mainly offset by an extraordinary charge in 2006-07 amounting to $11.6 million for the Research Council Employees' Association pay equity settlement for compensation of lost wages and interest to eligible employees employed between April 1, 1989 and March 31, 1999,

as well as a retroactive pay increment cost due to the ratification of three collective agreements.

Furthermore, included in NRC's total salaries and employee future benefits are expenses related to a realignment exercise which occurred in 2007-08. This exercise, while difficult, was completed to better align resources with the NRC strategy and to better position NRC for the future.

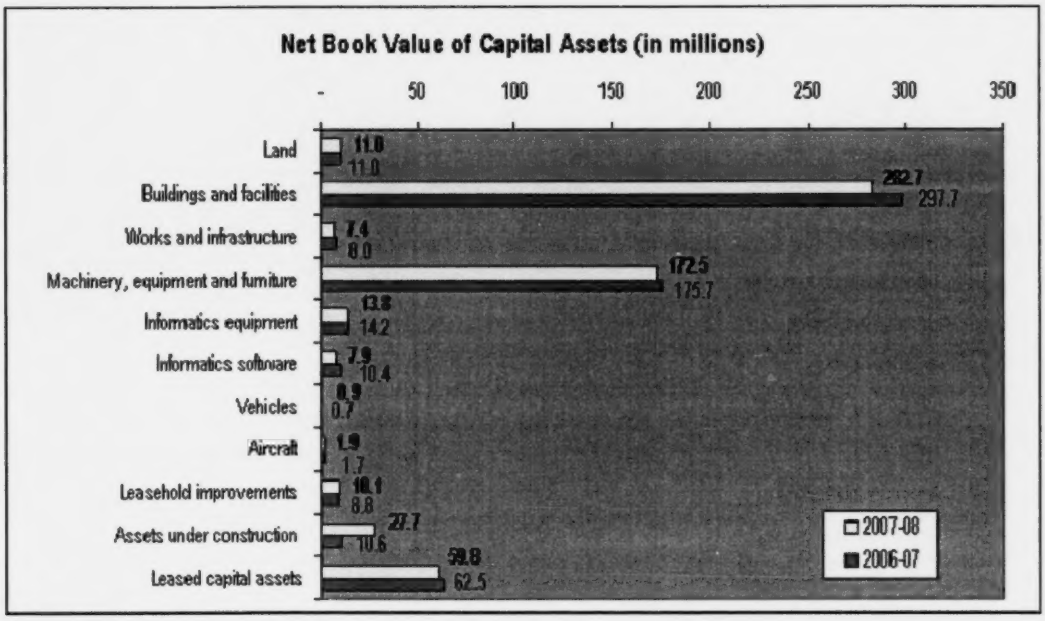
- ***Grants and Contributions:*** Grants and contributions remained relatively steady in 2007-08. NRC made total net contributions of $142 million in 2007-08, as compared to $143 million in 2006-07. Net contributions from NRC Industrial Research Assistance Program (NRC-IRAP) ($80.6 million) and contributions to the TRIUMF laboratory for particle and nuclear physics ($51.5 million) comprise 93% of the contributions made by NRC in the current fiscal year. In addition, contributions made through NRC Herzberg Institute of Astronomy (NRC-HIA) to support international telescopes ($9.2 million) make up the majority of the remaining balance.



STATEMENT OF FINANCIAL POSITION

Assets: NRC's total assets signify its ability to provide future services for Canadians. NRC's total assets as at March 31, 2008 totalled $851 million. NRC's largest single component is its capital assets, which represents 70% of the total. The following assets are highlighted to demonstrate NRC's activity with private and public sector clients.

- ***Capital Assets:*** In 2007-08, NRC acquired and or constructed $60.9 million in capital assets, which brings NRC's total capital asset net book value to $596 million. NRC's infrastructure is an important element for the successful delivery of its mandate; as such re-investments in capital assets are crucial. NRC's largest components of capital investments, as seen in the diagram below, are research buildings and facilities as well as machinery and equipment. Combined, they account for over 75% of the net book value of the capital investments.



- ***Accounts Receivable:*** At any given time, NRC has a significant amount of accounts receivable given that NRC finances a considerable amount of its operating and capital expenditures from external revenue. As at March 31, 2008, NRC's accounts receivable totalled $27.4 million ($26.9 million as at March 31, 2007).

- ***Inventory for resale and consumption:*** Both inventory for resale of $2.3 million and inventory for consumption of $2.4 million present NRC's future service potential. Inventory for consumption represents inventory which will be used internally by NRC in order to administer its research programs, whereas inventory for resale is marketed in its current state to customers.

Net debt: The government's net debt position is often called its "future revenue requirements" because this indicator provides a measure of the future revenues required to pay for past transactions and events. NRC's net debt *(financial assets less liabilities)* as at March 31, 2008 reached $71 million, which represents a slight decrease of $1 million from the previous fiscal year. The decline in net debt signifies that NRC's future revenue generation needs have decreased by 1.4%. Furthermore, the current year's decline in net debt demonstrates that NRC's revenues earned in 2007-08 sufficiently covered NRC's total incremental spending, inclusive of its capital spending.

Equity of Canada: NRC's equity of Canada as at March 31, 2008 was $541 million ($544 million as at March 31, 2007), which illustrates NRC's net resources (financial and non-financial) that will be used to provide invaluable future services for Canadians. NRC's equity of Canada is comprised of its Non-Financial Assets ($612 million) less its Net Debt ($71 million). NRC's largest component of Non-Financial Assets is capital assets.

NON-FINANCIAL HIGHLIGHTS

NRC Strategy 2006-2011: NRC continued implementation of its strategy, *Science at Work for Canada* and contributed to the advancement of the federal S&T Strategy. Following are some key achievements that were realized during the fiscal year:

- To help foster an Entrepreneurial Advantage, NRC developed initial plans for four of the identified NRC Key Industry Sectors (Aerospace, Construction, Information and Communication Technologies, Manufacturing and Materials). These sectors are of economic importance to Canada and their plans targeted research priorities of the federal S&T Strategy;
- To position Canada at the leading edge of important health and life science developments, and in keeping with one of the Strategy's core principles—partnerships—NRC created a National Bioproducts Program plan (to be co-led by NRC and Agriculture and Agri-Food Canada), including proposed areas of R&D focus;
- Guided by core principles of the federal S&T Strategy, NRC launched a cross-NRC initiative in Nanotechnology and developed a plan for a cross-NRC initiative in Advanced Materials, targeting both basic and applied research in this emerging and strategic opportunity area;
- To promote collaborative approaches, NRC began securing key third-party relationships in support of NRC National Programs and Key Industry Sectors of national interest from a social and economic perspective;
- Implemented a new NRC-wide business planning process and realigned organizational resources to more effectively support NRC program priorities as well as the priorities and directions in the federal S&T Strategy;
- Initiated facilities/equipment and information technology assessments to better understand long-term infrastructure investment requirements and identify opportunities for efficiency gains; and
- Launched a Central Business Services Office to help NRC better address client needs.

Governance: NRC has continued to implement a number of initiatives to improve its corporate governance, in keeping with the broad government goal of improved management in the public sector and the NRC Strategy.

In 2007-08, an updated Statement on the Role of Council was approved by members in order to incorporate greater input on strategic financial management. Consequently, NRC's Executive Committee will assume responsibility for strategic financial advice in current year budget reviews, including initial budget allocations; financial situation arising from NRC's multi-year plans; NRC's long term capital plan; and other matters that may have a significant impact on NRC's budget.

In 2007-08, NRC progressed in its implementation of the financial management model which holds the Chief Financial Officer (CFO) accountable to both the Comptroller General and the department head for financial management in the organization. The model was first introduced by NRC in 2005-06 as a result of recommendations provided for all federal government departments by the Office of the Comptroller General.

In 2007-08, all NRC Institutes/Branches/ Programs (IBP) were asked to develop rolling three-year business plans aligned with the NRC Strategy and the federal science and technology strategy.

These business plans will be updated on an annual basis to reflect changing internal and external factors, as well as the ongoing decisions and priorities of both the federal government and the NRC Senior Executives. The business planning process not only supports ongoing NRC strategic planning efforts, but also serves as the organization's key mechanism for financial resource allocation decisions (which are made by the Senior Executive Committee of NRC). The information contained in the business plans is expected to help NRC with its efforts in financial planning and budgeting, long-term capital planning (including real property), human resource planning, and information technology planning. Finally, the business plans serve as a critical vehicle for NRC-wide communication, helping senior managers to identify opportunities for greater cross-NRC collaboration.

Financial Statement Audit of NRC: In 2007-08, NRC's financial statements were prepared in accordance with Treasury Board accounting policies and year-end instructions issued by the Office of the Comptroller General, which are consistent with Canadian generally accepted accounting principles (GAAP) for the public sector. The financial statements were audited by the Office of the Auditor General. The audit provides added assurance with regards to the accuracy and completeness of NRC's financial information, therefore providing NRC's Council and senior management team with reliable information, from which strategic decisions can be taken.

Renewal of Terms and Conditions: In 2007-08, NRC-IRAP renewed the Terms and Conditions of its most significant transfer payment program ($72.5 million in expenses in 2007-08) for a period of 5 years. As such, Canada's small and medium sized enterprises will continue to receive essential technological and financial contributions from NRC, therefore increasing Canada's ability to innovate and maintain its presence within the global market place.

Audit of NRC-IRAP contribution recipients: In 2007-08, the audit completed on sample recipients of contributions from NRC-IRAP showed improved compliance with program requirements. In 2007-08, 87% of the contribution agreements audited received an unqualified audit opinion. This is a significant improvement from previous years, where unqualified audit results amounted to 54% in 2006-07 and 38% in 2005-06. A major contribution for this year's success is due to NRC-IRAP's recent implementation of a new financial monitoring framework which incorporates risk assessments prior to the commencement of, and during, each project.

DISCUSSION AND ANALYSIS

RISKS & UNCERTAINTIES

As a federal government departmental corporation, NRC funds the majority of its salary, operating and capital expenditures from parliamentary appropriations. The non-salary portion of this funding is fixed, with no indexing for price increases. As a result, the actual funding for NRC, in terms of buying power, has been declining over the past decade. In particular, the impact of rising costs related to payment in lieu of taxes and utilities is significant for NRC.

NRC owns and manages 185 specialized buildings that comprise approximately 560,140 square meters of space. It also has an equipment and informatics base of approximately $197 million

($203 million in 2006-07) net book value. NRC's capacity to fund the upgrade or replacement of these assets from its appropriations is limited, and as a result will need to secure sources of funding external to NRC for this purpose.

In addition, since 2004, the federal government has announced a series of budget reductions across federal departments as part of its realignment strategy and initiative to increase its efficiency. The impact on NRC has been significant and challenging. The cumulative reductions to date have amounted to $33.3 million, with a minimum expected ongoing reduction of $12.9 million per year. On a short-term basis, NRC has adapted to these changes by reducing investments in certain programs.

To help position itself to meet these challenges, NRC has implemented changes in its governance structure since 2005-06 and has made significant progress towards a new, focused business strategy. In order to continuously improve the planning, allocation and monitoring of resources, NRC implemented an annual IBP business planning process in 2007-08.

Details of other factors influencing NRC's budget pressures are provided below.

Sunsetting Funding: In order to ensure value for money, a Government of Canada practice is to provide funding for new initiatives on a sunsetting basis. This means that rather than providing a permanent increase in the NRC allotment, the government allocates funding for a limited period of time, with the option for renewal. Renewal is conditional on performance, linkages to priorities and availability of funding.

Although funding is not necessarily provided on an ongoing basis, new government-approved initiatives, such as the establishment of technology cluster sites in communities across Canada, often entails an ongoing commitment from NRC in terms of the construction and maintenance of new specialized facilities and the hiring of staff. There is also an expectation by the communities that support these new initiatives, and in some cases invest in them, that they will exist beyond the particular funding window. These challenges add complexity to the organization's planning, budgeting and operations.

Currently, NRC has several initiatives and projects funded on a sunsetting basis. Examples include the following:

- Technology Cluster Initiatives funding: Since its inception in 1999, NRC has received approval to spend a total of $598 million in technology cluster initiatives funding. To date, NRC has spent $475 million. The funding for all of NRC's technology cluster initiatives terminates in fiscal year 2009-10, at which point NRC must request additional support from the federal government.
- Astronomy funding: The funding for Phase I of Canada's Long Range Plan for Astronomy and Astrophysics (LRP) ended on March 31, 2007. Since its end, NRC has provided interim financing. A total of $97.5 million over five years is required for the LRP Phase II in order to maintain Canada's contribution to existing offshore telescopes and to pursue on-going LRP projects. Investing in the LRP Phase II could have additional future investment implications starting in 2010 depending on the government of Canada's decisions regarding its future role

in the astronomy LRP Thirty Meter Telescope (TMT) and the Square Kilometer Array (SKA) projects.

- Genomics R&D Initiatives funding: In 2007-08, NRC sought approval to renew the Genomics R&D Initiatives, which includes NRC as well as 5 other federal government departments. Total funding requested amounts to $19.9 million until fiscal year 2010-11.

Foreign Currency: NRC purchases roughly $55 million per year in goods and services in currencies other than the Canadian dollar, which exposes NRC to fluctuations in foreign exchange. The majority of foreign purchases (89% on average over the last five years) are transacted in US dollars. Due to the strengthening of the Canadian dollar over the last year, NRC has benefited from an increase in purchasing power over 2006-07 levels of approximately $4.2 million US. A continued strong Canadian dollar relative to the US dollar will benefit NRC's purchasing power, whereas a future decline in the Canadian dollar will have the opposite effect.

The 2007-08 gain in purchasing power was somewhat negated by the reduction in Canadian dollars received from foreign sales. In 2007-08, NRC received $34 million CDN on sales of $32.9 million US. By way of comparison, in 2006-07, NRC received $33.8 million CDN from $29.5 million US in sales.

Dependence on Revenue: The nature of NRC's activities permits NRC to generate revenues in order to reinvest in its operations. NRC's dependence on external sources of funding has been growing since the early 1990s. The portion of NRC's operating and capital expenditures funded from external sources of income was roughly 11% in 1991-92. In 2007-08, this percentage had climbed to over 24%.

In particular, NRC maintains technology centres that rely on external sources of revenue to fund the majority of their operations, namely NRC Centre for Surface Transportation (NRC-CSTT) and NRC Canadian Hydraulics Centre (NRC-CHC). In addition, NRC's two largest institutes –NRC Institute for Aerospace Research (NRC-IAR) and NRC Canada Institute for Scientific and Technical Information (NRC-CISTI) – rely on external sources of revenue to fund over 45% and 35% of their operations respectively. Significant downturns in the industries or federal departments that these groups support will greatly impact NRC's ability to continue operations at current levels.

Finally, it is important to note that NRC must strike a fine balance between providing contract research services that generate needed revenue, and performing the government-funded research that keeps NRC at the leading-edge of science, technology and innovation. Too much emphasis on revenue generating contract research could compromise NRC's advanced knowledge and technology base, which in the long-term will reduce NRC's ability to serve industry and respond to the needs of the nation in critical fields such as energy, the environment, health and wellness, and other priority areas outlined in the NRC Strategy.

FINANCIAL ANALYSIS

The following is an analysis that explains the meaning of certain financial statement items, significant variances, and financial trends.

ASSETS

Due from Consolidated Revenue Fund: This amount represents the amount of cash that NRC is entitled to draw from the federal government treasury. This includes cash to discharge its liabilities for which NRC has already received an appropriation, as well as revenue received but not spent. The $3.2 million decrease between 2006-07 and 2007-08 is due to the decrease in revenue available for use in subsequent years.

Accounts Receivable:

NRC-IRAP TPC Repayable Contributions

The NRC-IRAP Technology Partnerships Canada (TPC) program has been administered by NRC on behalf of Industry Canada since 1998. This program provides conditionally repayable contributions to small and medium-sized enterprises (SMEs) to support the pre-commercialization phase of their technology development. This conditional repayment program in most cases requires quarterly repayments of the contribution based on a percentage of the recipient's gross revenue. This program terminated March 31, 2006, although it will continue to fund, and require repayment from existing agreements during its wind-down phase.

This program supports small start-up firms, whose future success is often entirely dependent on one technology. Failure to bring the technology to market, at times, can result in the firm ceasing operations. Even with the very high-risk nature of this program, NRC has received repayments amounting to approximately 25% of contributions disbursed as at March 31, 2008 (20% – 2007). With 280 projects still being administered, this percentage is expected to increase over the next decade.

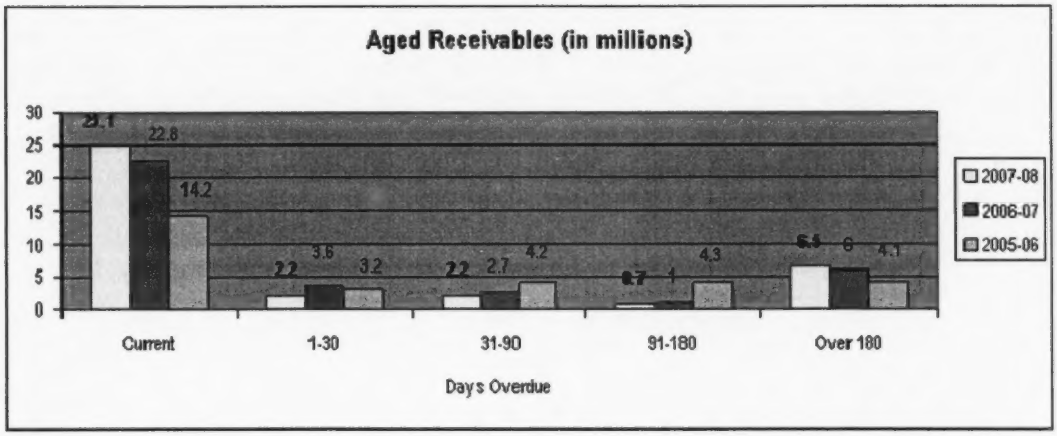
The NRC-IRAP TPC accounts receivable as at March 31, 2008 was $9.9 million ($10.7 million - 2007) with a corresponding allowance for doubtful accounts of $8.3 million ($7.1 million - 2007), highlighting the high risk nature of the program.

Trade Receivables and NRC-IRAP Audit Recoveries

NRC had accounts receivable with external clients worth $20.9 million as at March 31, 2008 ($19.6 million - 2007) with a corresponding allowance for doubtful accounts equal to $1.1 million ($2.2 million - 2007). This amount represents receivables for work done with external clients as well as receivables for audit findings for NRC-IRAP. Write-offs in 2007-08 were $938 thousand ($603 thousand in 2006-07), which is low given the total value of NRC revenue.

Aged Accounts Receivable

In 2007-08 and 2006-07, 80% of accounts receivable are aged 90 days or below. NRC has successfully focused on collecting its outstanding receivables. The aging of all accounts receivable, gross of allowances, as at March 31 is as follows:



Inventory for Resale: NRC produces a number of products that are purchased by external clients, namely the Model National Construction Codes, monographs and certified reference materials. Inventory for resale is presented at its lower of cost or net realizable value and has decreased by $545 thousand (19%) over 2007 closing values. The decline is due to an increase in the allowance for obsolete inventory, increased by $500 thousand to $1.1 million in 2007-08.

Equity Investments: As part of its mandate to promote industrial innovation in Canada, NRC provides financial assistance to firms through access to equipment, intellectual property and incubation space in its laboratories and Industrial Partnership Facilities. Since these companies are often in their infancy and cannot afford to pay the full cost of the assistance received, NRC, on occasion, takes an equity position in the company in return for the assistance provided. This helps the firms survive the critical technology development stage. It is not management's intention to hold equity investments over the long-term. NRC will consider timely opportunities for divestiture of equity investments by taking into account the interests, market liquidity and expected future growth of the company.

The full value recorded on the statement of financial position reflects NRC's investment in publicly-traded companies as its shares in privately held corporations are deemed to have no market value. Details of NRC's investment in public companies are as follows:

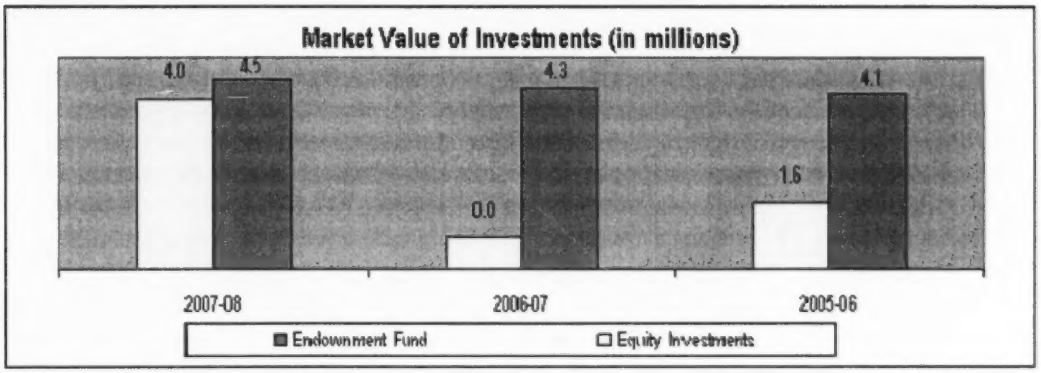
Company Name	Number of Shares	Amount Recorded in Financial Statements	Market Value at March 31, 2008
PharmaGap Inc.	1,305,425	$ 392,933	$ 117,488
Chemaphor Inc.	1,260,305	$ 252,061	$ 277,267
Pure Energy Visions Corp.	210,000	$ 1	$ 79,800
Omnitech Consultant Group Inc.	866,494	$ 1	$ 0
IMRIS Inc.	795,578	$ 1	$ 3,540,322
Total	**4,437,802**	**$ 644,997**	**$ 4,014,877**

NRC's equity investments, presented on the Statement of Financial Position at $645 thousand, reached a fair market value of $4 million as at March 31, 2008, which represents an increase of

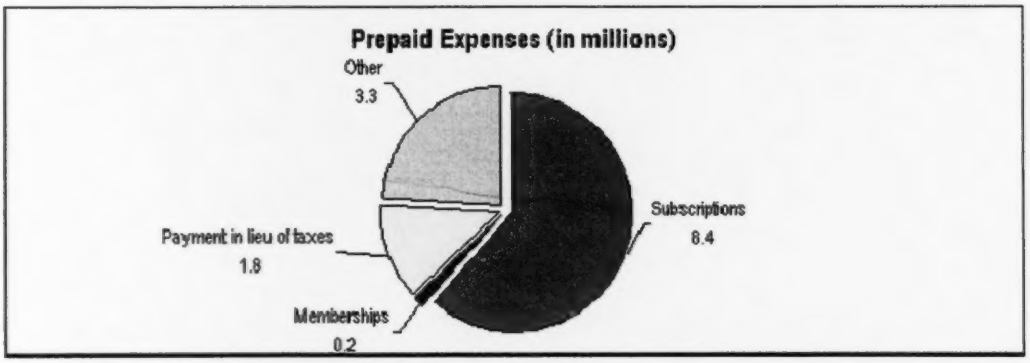
$3.3 million from the previous fiscal year. The increase is mainly due to the initial public offering of IMRIS Inc. in 2007-08, in which NRC had previously received common shares in settlement of debt owing.

Holmes Fund Investments: The Holmes Endowment Fund is an investment bequeathed to NRC in July 1994. Up to two-thirds of the endowment fund's yearly net income is used to finance the H.L. Holmes award on an annual basis. The award covers a one or two-year period and provides the opportunity to Canadian post-doctoral students to study at world famous graduate schools or research institutes under outstanding researchers. In 2007-08, NRC granted $93 thousand to the recipient of the 2007 NRC H.L. Holmes Award who will receive a total of $198 thousand, ending in July 2009. The recipient is using the award to fund two years of collaborative research at the Harvard Medical School.

In addition, the endowment fund reached a fair market value of $4.5 million as at March 31, 2008 ($4.3 million as at March 31, 2007). The investments within the portfolio had an average effective return of 4.7%. The endowment fund is presented at an amortized cost of $4.3 million ($4.2 million as at March 31, 2007) on the Statement of Financial Position and not at fair value.



Prepaid Expenses: NRC's prepaid expense as at March 31, 2008 was $13.6 million. NRC prepays for goods and services only when contractually obligated. Subscriptions form the primary component of NRC's prepaid expenses. NRC Canada Institute for Scientific and Technical Information (NRC-CISTI), Canada's science library, subscribes to many of the world's major scientific and technical journals and databases.



Capital Assets: NRC's capital asset net book value has decreased from $601 million in 2006-07 to $596 million in 2007-08. This $5 million decrease largely transpired given that NRC's amortization for the year ($66.6 million) exceeded its acquisitions ($60.9 million). The cost of capital assets has increased by 3% to $1,348 million in 2007-08. The $40.6 million increase is attributable to $60.9 million in acquisitions, offset by $20.3 million in various transfers, disposals and write-offs.

Acquisitions

NRC spent $60.9 million on capital expenditures during 2007-08, a slight decrease from the $62.1 million spent in 2006-07 (excluding new capital leases recognized of $58.1 million). Of the $60.9 million in capital asset additions, $21 million relates to assets which are currently under construction. The remaining balance is primarily made up of acquisitions related to machinery and equipment ($25.3 million), as well as buildings and facilities ($7.8 million).

The following represents significant capital assets expenditures in 2007-08:

- Energy Retrofit project in progress for NRC Institute for Chemical Process and Environmental Technology (NRC-ICPET). NRC has spent $2.6 million on this project in 2007-08. Once complete, the energy retrofit project will improve the operating efficiency and effectiveness of the building, therefore transferring the current investment into future cost savings for NRC. NRC-ICPET also installed an emergency generator at a cost of $426 thousand.
- NRC Institute for Research Construction (NRC-IRC) is in the process of constructing a new facility which will be used primarily to support activities within the Indoor Air Research and Development Initiative, which is part of the Clean Air Agenda. Costs incurred to March 31, 2008 for the construction of this facility amounts to $994 thousand.
- NRC Institute for Aerospace Research (NRC-IAR) is currently in the process of constructing and or renovating a number of its facilities. As at March 31, 2008, approximately $3.3 million has been spent. In addition, NRC-IAR is constructing a Fiber Placement Composite machine in order to develop and manufacture medium to full-scale size composite parts for aerospace applications. Costs to date for the construction of the equipment amount to $5.9 million.
- NRC Institute for Ocean Technology (NRC-IOT) has replaced the beach structure component of its wave tank in 2007-08 at a total cost of $750 thousand. The replacement of the major component was required to ensure that future research tests produce accurate results to ensure that NRC-IOT continues to provide world-class research.

- NRC Plant Biotechnology Institute (NRC-PBI) has purchased a new genetic analyzer in 2007-08 at a total cost of $604 thousand. The instrument provides high throughput and high quality DNA sequence information which is essential for NRC research. This instrument is unique within NRC as well as within the federal government research system.
- NRC's oldest property located on Sussex Drive in the National Capital Region received a new skylight and ventilation system in 2007-08 at a total cost of $820 thousand. The renovations were required in order to maintain the accurate balance of atmospheric pressure within the building.

LIABILITIES

Accounts Payable and Accrued Liabilities: NRC's accounts payable and accrued liabilities decreased by $3.1 million in 2007-08, mainly explained by the following:

NRC's accrued salary which represents salary earned by personnel up to March 31, 2008 for which they have not received compensation, decreased by $2.3 million in comparison with the previous year. The accrual decreased this year given that a retroactive salary adjustment was recorded in the previous year following the ratification of the Administrative Services (AS), Administrative Support Group (AD) and Computer Systems Administrative (CS) collective agreements. In addition, NRC did not require an accrual at year end as was done in the previous year for its portion of payments in lieu of taxes from the City of Ottawa, given that all of its liabilities were paid as at March 31, 2008, reducing accounts payable and accrued liabilities by $2.2 million. The decreases are offset by a $1.1 million increase in contractor holdback liabilities at year-end, given that NRC had several large construction projects in progress.

Vacation Pay and Compensatory Leave: Due to the nature of NRC's operations, a number of NRC's collective agreements do not impose maximum limits of accumulated vacation to be carried forward to subsequent fiscal years by employees. Consequently, vacation pay and compensatory leave have steadily increased over the years.

Deferred Revenue:

Contributions Related to Leased Capital Assets

Deferred revenue is recognized for contributions related to leased capital assets. For NRC purposes, this is associated with leases of facilities for $1 per year with the University of Alberta, the University of Prince Edward Island, and the University of Western Ontario. As at March 31, 2008 this balance was $59.8 million. This balance has decreased by $2.7 million in the current year, and the decline is expected to continue given that associated revenue is recognized in accordance with the useful life of the related asset. Consequently, this account increases only when new capital leases are established. On such occasions, NRC will establish a non-financial capital asset as well as corresponding deferred revenue equal to the value of the capital lease. Over time and as the asset is used, NRC recognizes equal amounts of amortization and revenue (lease inducement revenue). As a result, no impact occurs on NRC's net cost of operations or its Equity of Canada.

Specified Purpose Accounts

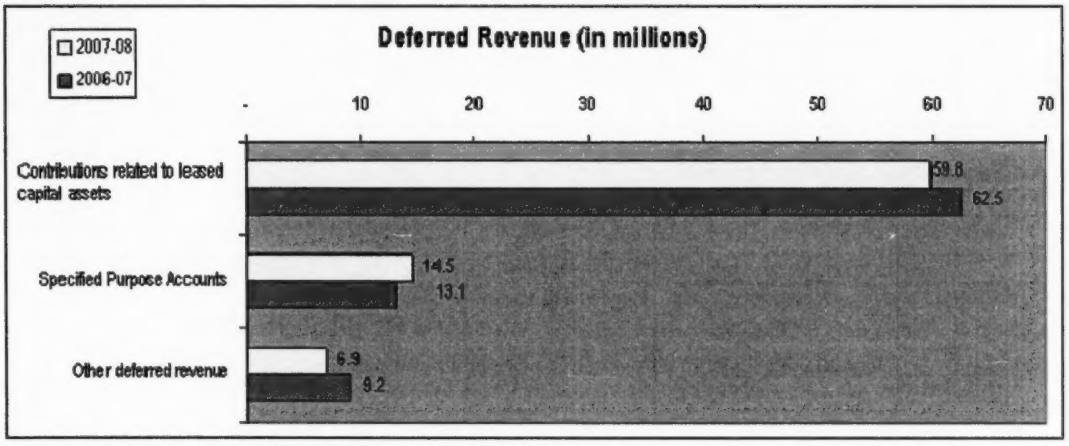
NRC undertakes collaborative work with clients for the mutual benefit of both parties. Funding provided by the collaborator is placed in a Specified Purpose Account (SPA) and used over the duration of the project. Amounts remaining in the SPA at year-end are recorded as deferred revenue as it is expected that it will be used in the upcoming year on the project. At the end of 2007-08, this amount totalled $14.5 million, representing an increase of 10% over the previous year.

Other

Other deferred revenue consists primarily of research press deferred revenue, as well as conference and seminar registration deferred revenue. NRC had other deferred revenues of $6.9 million as at March 31, 2008 as compared to $9.2 million at March 31, 2007. The decrease of $2.3 million (25%) is mainly attributable to the decrease in the number of Research Press subscriptions outstanding as at March 31, 2008 as well as the decline in the value of the US dollar given that all Research Press subscriptions are sold in US currency.

- Research Press: NRC Canada Institute for Scientific and Technical Information (NRC-CISTI) publishes research journals that are available for purchase on a subscription basis. When NRC receives payment for the subscription, it records the amount as deferred revenue and then recognizes the revenue each month as the journal is issued.

- Conference and Seminar Registration: NRC conducts many conferences and seminars which often require registration many months in advance of the conference date. Receipts from registration are recorded as deferred and recognized when the conference takes place.

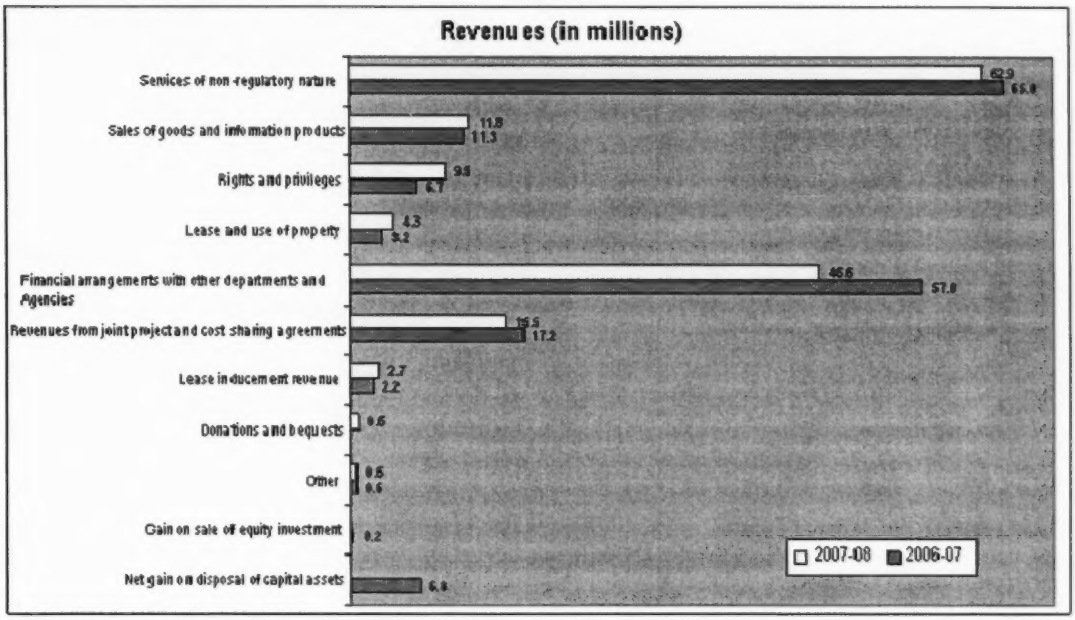


Environmental liability: NRC's environmental liability has decreased from $300 thousand to $100 thousand in 2007-08. The estimated liability to remediate the land was reduced following a comprehensive environmental study completed on NRC's Penticton solid waste landfill site. Furthermore, to ensure the protection of the environment and the public, NRC has finalized in 2007-08 its plan to assess all research sites occupied by NRC. The first phase, which is scheduled

to be completed in 2008-09, consists of site risk assessments. This first phase is critical to ensure that NRC directs further attention and resources on priority research sites.

REVENUES

NRC's revenues for 2007-08 were $155 million as compared to $170 million in 2006-07. Recent trends in revenue components are shown in the following graph. The decrease results from isolated transactions, which when removed, demonstrate that NRC's ongoing operational revenue actually increased by $1 million in the current fiscal year.



Services of a Non-Regulatory Nature: In 2007-08, 40% ($62.9 million) of NRC revenues were generated from services of a non-regulatory nature, which primarily consists of research services provided directly to industry and academic clients. In 2007-08, NRC Institute for Aerospace Research (NRC-IAR) and NRC Canada Institute for Scientific and Technical Information (NRC-CISTI) accounted for over 43% of NRC's service revenues, compared to 46% in 2006-07.

Sales of Goods and Information Products: As part of its goal to disseminate scientific and technical information of importance to industry, NRC has publications and certified reference materials that it sells to clients. Total sales of goods and information products totalled $11.8 million in 2007-08, as compared to $11.3 million in 2006-07. The largest component of revenue derived from sales of goods and information products is due to research press journals sold through Canada's scientific library. Research press income earned in 2007-08 was $6.5 million, compared to $5.8 million in 2006-07. This increase would have been more significant, however the steady decline of the US dollar in 2007-08 has reduced the impact, given that all research press journals are sold in US currency.

Rights and Privileges: Royalty revenue is earned from companies that license the rights to use NRC technology. Royalties are typically based on a percentage of the licensee's sales. In 2007-08, NRC generated $9.5 million in royalties, up from $6.7 million in 2006-07 and $5.8 million in 2005-06. The rise in revenue is primarily associated with NRC's Institute for Biological Sciences (IBS) which earned revenue of $5.3 million in 2007-08, up from $3.5 million in 2006-07 and $3.8 million in 2005-06, from which its largest royalties are earned through its license for the Meningitis C vaccine.

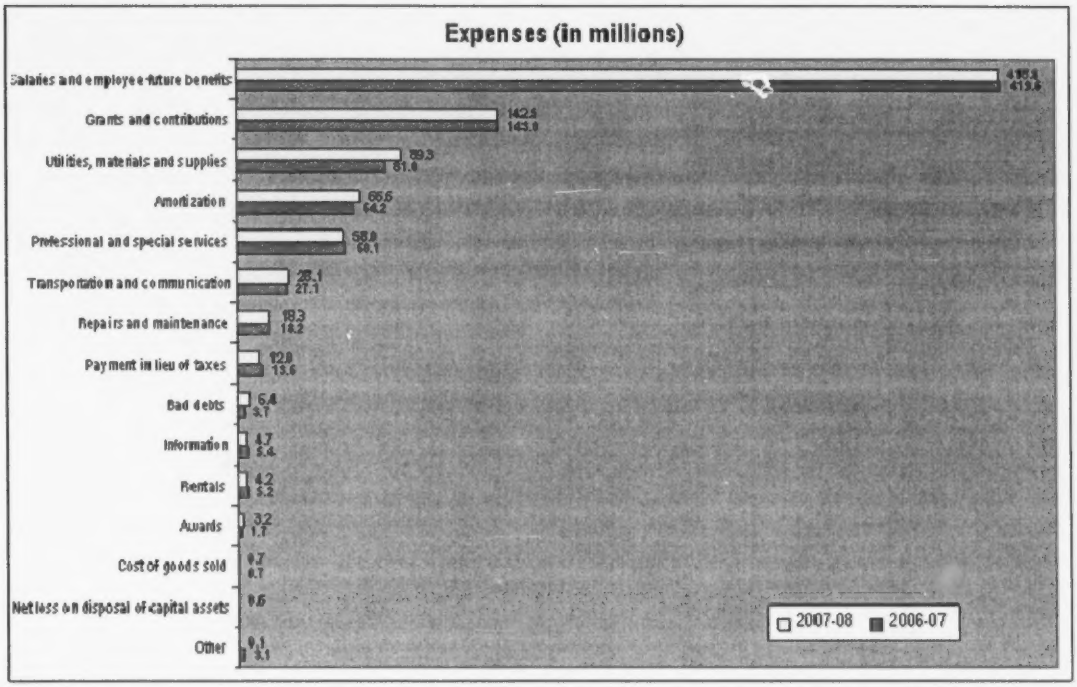
Lease and Use of Property: Facilitating access to NRC researchers and facilities is an important part of technology transfer at NRC. To this end, NRC provides laboratory space to companies on a commercial basis, often as part of a collaboration or technology transfer agreement. Revenue from lease and use of property amounted to $4.3 million in 2007-08, as compared to $3.2 million in 2006-07. The 34% increase in the current year is primarily associated with additional agreements at NRC Biotechnology Research Institute and NRC Industrial Materials Institute.

Financial Arrangements with Other Departments and Agencies: NRC undertakes research on behalf of other federal government departments. The incremental costs associated with this work are reimbursed to NRC. In 2007-08, the amount of work undertaken for other government departments was significant, totalling $46.6 million ($57 million in 2006-07 and $58.8 million in 2005-06). The decline of $10.4 million in revenue is associated with NRC's Technology Partnerships Canada (TPC) program with Industry Canada. The TPC transfer payment program terminated on March 31, 2006, and as such only existing associated contracted projects continue to receive funding from NRC. Consequently, revenue has declined significantly in the past three years. In 2007-08, the NRC received a total of $4.5 million, as compared to $15 million in 2006-07 and $18.8 million in 2005-06.

Revenues from Joint Project and Cost Sharing Agreements: NRC also receives income through collaborative research projects that involve cost sharing arrangements for work that is likely to lead to new expertise or technology. In 2007-08, collaborative funding across all sectors at NRC earned a total of $15.5 million ($17.2 million in 2006-07 and $21 million in 2005-06). Revenue from joint research projects are not recognized until the project is complete. As such, revenue can fluctuate slightly depending on the number of on-going projects at year end.

EXPENSES

As noted in the Highlights section, NRC's expenses increased from $847 million in 2006-07 to $853 million in 2007-08. 49% of expenses represents salary and benefits costs.



Salaries and Employee Future Benefits

Salaries decreased by approximately $1 million from 2006-07. In 2006-07, three collective agreements were ratified at year end, therefore causing a large one time adjustment of $4 million for retroactive pay increments in addition to a pay equity settlement of $7.6 million. The absence of one time adjustments in 2007-08 were offset by increases for general pay increments.

Grants and Contributions

In 2007-08, grants and contributions from NRC remained stable in comparison to the previous fiscal year. The largest category of NRC grants and contributions relates to funding allocated to small and medium-sized enterprises (SMEs) through NRC-IRAP. These increased to $72.5 million in 2007-08, from $65 million in 2006-07. However, NRC-IRAP distributed only $2.9 million in contributions for the TPC program, down from $11.6 million in 2006-07, due to the winding down of the program. A decrease in contributions expense of $3.6 million also resulted from an increase related to the allowance for uncollectible (or write-off) TPC receivables in 2007-08, as the transfer payment to Industry Canada is reduced accordingly.

NRC's contribution to TRIUMF, Canada's national laboratory for particle and nuclear physics, increased from $45.5 million in 2006-07 to $51.5 million in 2007-08. The increase was provided to fund operation and maintenance expenses in order to satisfy facility conformity costs. TRIUMF is an unincorporated association that operates a research laboratory.

Contributions made through the NRC Herzberg Institute of Astronomy (NRC-HIA) to support international telescopes totalled $9.2 million in 2007-08, compared to $12.6 million in 2006-07. The decrease is due to instrument construction delays as well as the purchasing power increase of the Canadian dollar.

Utilities, Materials and Supplies

In 2007-08, expenses related to utilities, materials and supplies reached $89.3 million, as compared to $81 million in 2006-07. The $8.3 million increase primarily results from NRC's accounting treatment of prepaid expenses. In 2006-07, NRC-CISTI set up a large prepaid for its serial renewal subscriptions, consequently reducing the expense incurred in 2006-07. As a result, the expense incurred in 2007-08 increased by approximately $5.4 million. The remaining balance can be attributed to NRC Herzberg Institute for Astronomy, which incurred additional expenses of $2.9 million in 2007-08 due to project requirements.

Bad Debts

NRC's bad debt expense increased from $3.7 million in 2006-07 to $6.4 million in 2007-08. The increase is related to write-offs recorded in the year for bad debts within NRC-IRAP's TPC program, as discussed within the Grants and Contributions section.

Awards

In 2007-08, award costs increased from $1.7 million in 2006-07 to $3.2 million in 2007-08. The additional award costs are related to NRC's rights and privileges revenue, which was $9.5 million in 2007-08. The awards expense has a direct relationship with revenue given that patent awards are distributed to personnel as income is earned from the respective license agreements. NRC distributes a maximum of 35% of revenue earned to personnel responsible for the creation of the commercial patent. Consequently, a rise in royalty revenue results in a corresponding increase in award costs.

Other Expenses

Other Expenses amounted to $58 thousand in 2007-08, as compared to $3.1 million in 2006-07. The main reason for the decrease in other expenses is due to the pay equity settlement recognized in 2006-07 of $2.9 million related to damages pursuant to the *Canadian Human Rights Act* to all Eligible Employees of the Research Council Employees' Association.

NRC·CNRC

Financial Statements

National Research Council of Canada

March 31, 2008

Auditor General of Canada
Vérificatrice générale du Canada

AUDITOR'S REPORT

To the National Research Council of Canada
and the Minister of Industry

I have audited the statement of financial position of the National Research Council of Canada (the Council) as at March 31, 2008 and the statements of operations, equity of Canada and cash flow for the year then ended. These financial statements are the responsibility of the Council's management. My responsibility is to express an opinion on these financial statements based on my audit.

I conducted my audit in accordance with Canadian generally accepted auditing standards. Those standards require that I plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In my opinion, these financial statements present fairly, in all material respects, the financial position of the Council as at March 31, 2008 and the results of its operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles.

Further, in my opinion, the transactions of the Council that have come to my notice during my audit of the financial statements have, in all significant respects, been in accordance with the *Financial Administration Act* and regulations, the *National Research Council Act* and regulations and the by-laws of the Council.

John Wiersema, FCA
Deputy Auditor General
for the Auditor General of Canada

Ottawa, Canada
June 13, 2008

240 rue Sparks Street, Ottawa, Ontario K1A 0G6

National Research Council of Canada

Statement of Management Responsibility

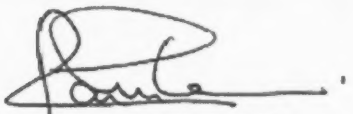
Responsibility for the integrity and objectivity of the accompanying financial statements for the year ended March 31, 2008 and all information contained in these statements rests with the National Research Council of Canada's (NRC) management. These financial statements have been prepared by management in accordance with Treasury Board accounting policies and year-end instructions issued by the Office of the Comptroller General which are consistent with Canadian generally accepted accounting principles for the public sector.

Management is responsible for the integrity and objectivity of the information in these financial statements. Some of the information in the financial statements is based on management's best estimates and judgment and gives due consideration to materiality. To fulfill its accounting and reporting responsibilities, management maintains a set of accounts that provides a centralized record of NRC's financial transactions. Financial information submitted to the *Public Accounts of Canada* and included in NRC's *Performance Report* and *Annual Report* is consistent with these financial statements.

Management maintains a system of financial management and internal controls designed to provide reasonable assurance that financial information is reliable, that assets are safeguarded and that transactions are in accordance with the *Financial Administration Act*, are executed in accordance with prescribed regulations, within Parliamentary authorities, and are properly recorded to maintain accountability of Government funds. Management also seeks to ensure the objectivity and integrity of data in its financial statements by careful selection, training and development of qualified staff, by organizational arrangements that provide appropriate divisions of responsibility, and by communication programs aimed at ensuring that regulations, policies, standards and managerial authorities are understood throughout NRC.

The role of the Audit, Evaluation, and Risk Management Committee of NRC, that was established in June 2005, is to ensure that the proper review procedures are in place, to obtain the results of the audits and evaluations, especially in sensitive areas and in areas of concern and to be informed of the corrective actions taken or planned to be taken by management.

The financial statements of NRC have been audited by the Auditor General of Canada, the independent auditor for the Government of Canada.



Pierre Coulombe, Ph.D., P.Eng.
President

Daniel Gosselin, FCA
Chief Financial Officer

Ottawa, Canada
June 13, 2008

National Research Council of Canada
Statement of Financial Position
as at March 31

(in thousands of dollars)	2008	2007
ASSETS		
Financial Assets		
Due from the Consolidated Revenue Fund	204,764	207,971
Accounts receivable and advances (Note 4)	27,364	26,880
Inventory for resale	2,328	2,873
Equity investments (Note 5)	645	646
Endowment fund investments (Note 6)	4,310	4,192
	239,411	242,562
Non-Financial Assets		
Prepaid expenses	13,634	12,750
Inventory for consumption	2,445	2,111
Capital assets (Note 7)	595,722	601,363
	611,801	616,224
TOTAL ASSETS	851,212	858,786
LIABILITIES AND EQUITY OF CANADA		
Liabilities		
Accounts payable and accrued liabilities (Note 8)	127,777	130,803
Vacation pay and compensatory leave	40,150	39,791
Deferred revenue (Note 9)	81,246	84,834
Employee future benefits (Note 10)	61,124	58,788
Environmental liabilities (Note 11)	100	300
	310,397	314,566
Equity of Canada	540,815	544,220
TOTAL LIABILITIES AND EQUITY OF CANADA	851,212	858,786

Contingent liabilities (Note 11) and contractual obligations (Note 12)

The accompanying notes form an integral part of these financial statements.

Approved by:

Pierre Coulombe, Ph.D., P.Eng.
President

Daniel Gosselin, FCA
Chief Financial Officer

National Research Council of Canada
Statement of Operations
for the year ended March 31

(in thousands of dollars)	2008	2007
Expenses (Note 13)		
Research and development	601,723	600,627
Technology and Industry support	251,265	246,028
	852,988	846,655
Revenues (Note 14)		
Research and development	101,740	109,621
Technology and Industry support	52,790	60,536
	154,530	170,157
Net Cost of Operations	**698,458**	**676,498**

The accompanying notes form an integral part of these financial statements.

National Research Council of Canada
Statement of Equity of Canada
for the year ended March 31

(in thousands of dollars)	2008	2007
Equity of Canada, beginning of year	544,220	507,227
Net cost of operations	(698,458)	(676,498)
Net cash provided by Government (Note 3)	673,127	655,005
Change in due from the Consolidated Revenue Fund	(3,207)	30,874
Services received without charge (Note 15)	25,133	27,612
Equity of Canada, end of year	540,815	544,220

The accompanying notes form an integral part of these financial statements.

National Research Council of Canada
Statement of Cash Flow
for the year ended March 31

(in thousands of dollars)	2008	2007
Operating Activities		
Net cost of operations	698,458	676,498
Non-cash items		
Amortization of capital assets	(66,555)	(64,210)
Gain on sale of equity investments	-	223
Net (loss) gain on disposal of capital assets	(597)	6,823
Services received without charge (Note 15)	(25,133)	(27,612)
Other	1,166	2,451
Variations in Statement of Financial Position		
Increase in accounts receivable and advances	484	5,791
Decrease in inventory for resale	(545)	(716)
Increase in endowment fund investments	118	115
Increase in prepaid expenses	884	7,280
Increase (decrease) in inventory for consumption	334	(105)
Decrease (increase) in liabilities	4,169	(55,746)
Cash used by operating activities	612,783	550,792
Capital Investment Activities		
Acquisitions of capital assets	60,939	120,172
Proceeds from disposal of capital assets	(594)	(15,327)
Cash used by capital investment activities	60,345	104,845
Investing Activities		
Proceeds from sale of equity investments	(1)	(632)
Cash used by investing activities	(1)	(632)
Financing Activities		
Net cash provided by Government of Canada (Note 3)	(673,127)	(655,005)

The accompanying notes form an integral part of these financial statements.

1. Authority and Objectives

The National Research Council of Canada (NRC) exists under the *National Research Council Act* and is a departmental corporation named in Schedule II of the *Financial Administration Act*. The objectives of NRC are to create, acquire and promote the application of scientific and engineering knowledge to meet Canadian needs for economic, regional and social development and to promote and provide for the use of scientific and technical information by the people and the Government of Canada.

In delivering its mandate, NRC reports under the following program activities:

- research and development; and
- technology and industry support.

These program activities also include NRC's priorities of enhancing development of sustainable technology clusters for wealth creation and social capital as well as program management for a sustainable organization.

2. Summary of Significant Accounting Policies

These financial statements have been prepared in accordance with Treasury Board accounting policies and year-end instructions issued by the Office of the Comptroller General, which are consistent with Canadian generally accepted accounting principles for the public sector. The significant accounting policies are:

a) Parliamentary Appropriations

NRC is financed mainly by the Government of Canada through Parliamentary appropriations. Appropriations provided to NRC do not parallel financial reporting according to Canadian generally accepted accounting principles since appropriations are primarily based on cash flow requirements. Consequently, items recognized in the statement of operations and the statement of financial position are not necessarily the same as those provided through appropriations from Parliament. Note 3 provides a high-level reconciliation between the bases of reporting.

b) Net Cash Provided by Government

NRC operates within the Consolidated Revenue Fund, which is administered by the Receiver General for Canada. All cash received by NRC is deposited to the Consolidated Revenue Fund and all cash disbursements made by NRC are paid from the Consolidated Revenue Fund. The net cash provided by Government is the difference between all cash receipts and all cash disbursements including transactions between departments (including agencies) of the federal government.

c) Due from the Consolidated Revenue Fund

Due from the Consolidated Revenue Fund represents the amount of cash that NRC is entitled to draw from the Consolidated Revenue Fund without further appropriations.

d) Revenues / Deferred revenue

- Revenue is recognized in the year in which the underlying transaction or event occurred that gave rise to revenue.
- Revenue from license fees, joint research projects and other sources is deposited to the Consolidated Revenue Fund and is available for use by NRC.
- License fees received for future year license periods are recorded as deferred revenue and amortized over the license period.
- Funds received from third parties for specified purposes are recorded upon receipt as deferred revenue and recognized as revenue in the year in which the related expenses are incurred.
- Contributions of leased capital assets are deferred and amortized to operations on the same basis as the related depreciable capital assets.

e) Expenses

- Grants are recognized in the year in which the conditions for payment are met. In the case of grants which do not form part of an existing program, the expense is recognized when the Government announces a decision to make a non-recurring transfer, provided the enabling legislation or authorization for payment receives parliamentary approval prior to the completion of the financial statements.
- Contributions are recognized in the year in which the recipient has met the eligibility criteria or fulfilled the terms of a contractual transfer agreement.
- Vacation pay and compensatory leave are expensed as the benefits accrue to employees under their respective terms of employment.
- Services received without charge from other government departments and agencies are recorded as operating expenses at their estimated cost.

f) Employee future benefits

i) Pension Benefits

Eligible employees participate in the Public Service Pension Plan, a multiemployer plan administered by the Government of Canada. NRC's contributions to the Plan are charged to expense in the year incurred and represent NRC's total obligation to the Plan. Current legislation does not require NRC to make contributions for any actuarial deficiencies of the Plan.

ii) Severance Benefits

Employees are entitled to severance benefits under labour contracts or conditions of employment. These benefits are accrued as employees render the services necessary to earn them. The obligation relating to the benefits earned by employees is calculated using information derived from the results of the actuarially determined liability for employee severance benefits for the Government as a whole.

g) Accounts receivable

Accounts receivable are stated at amounts expected to be ultimately realized; a provision is made for receivables where recovery is considered uncertain.

h) Conditionally repayable contributions

Conditionally repayable contributions are contributions that, all or part of which become repayable, if conditions specified in the contribution agreement come into effect. Accordingly, they are not recorded on the Statement of Financial Position until the conditions specified in the agreement are satisfied at which time they are then recorded as a receivable and a reduction in transfer payment expenses. An estimated allowance for uncollectibility is recorded where appropriate.

i) Contingent liabilities

Contingent liabilities are potential liabilities, which may become actual liabilities when one or more future events occur or fail to occur. To the extent that the future event is likely to occur or fail to occur, and a reasonable estimate of the loss can be made, an estimated liability is accrued and an expense recorded. If the likelihood is not determinable or an amount cannot be reasonably estimated, the contingency is disclosed in the notes to the financial statements.

j) Environmental liabilities

Environmental liabilities reflect the estimated costs related to the management and remediation of environmentally contaminated sites. Based on management's best estimates, a liability is accrued and an expense recorded when the contamination occurs or when NRC becomes aware of the contamination and is obligated, or is likely to be obligated to incur such costs. If the likelihood of NRC's obligation to incur these costs is either not determinable or unlikely, or if an amount cannot be reasonably estimated, the costs are disclosed as contingent liabilities in the notes to the financial statements.

k) Inventory

Inventory for resale and for consumption is recorded at the lower of cost (using the average cost method) or net realizable value. The cost is charged to operations in the year in which the items are sold or used.

l) Equity investments

Equity investments include shares in publicly and privately held companies. Equity investments are typically obtained as a result of debt settlement negotiations or as a result of non-monetary transactions (where financial assistance at better-than-market conditions was provided to firms through access to intellectual property, equipment and incubation space in laboratories). If the estimates of the non-monetary transactions cannot be determined, the equity investments are initially recorded at a nominal value. Otherwise they are initially recorded at fair value based on market prices. If the fair value of equity investments becomes lower than the book value and this decline in value is considered to be other than temporary, the equity investments are written down to fair value.

m) Endowment Fund Investments

Endowments consist of restricted donations subject to externally imposed restrictions stipulating that the resources be maintained permanently. Income from the investment of endowments may only be used for the purposes established by the donors.

Endowments are recognized as an asset when the amount to be received can be reasonably estimated and ultimate collection is reasonably assured. Income from endowments is recorded as deferred revenue and recognized as revenue in the year in which the related expenses are incurred.

Funds received for endowments are invested in bonds and are carried at amortized cost. The premium or discount determined at the time of acquisition is amortized until the security's maturity. Fair value of bonds is based on market prices.

n) Foreign Currency Transactions

Transactions involving foreign currencies are translated into Canadian dollar equivalents using rates of exchange in effect at the time of those transactions. Monetary assets and liabilities denominated in foreign currencies are translated using rates at year end. Gains and losses resulting from foreign currency translation are reported on the Statement of Operations according to the activities to which they relate. Net gains and losses relating to the sale of goods or services in foreign currency are included in revenues. Net gains and losses relating to the purchase of goods or services in foreign currency are included in expenses.

o) Capital Assets and Amortization

Capital assets and leasehold improvements having an initial cost of $5,000 or more are recorded at their acquisition cost. Contributed capital assets are recorded at market value at the date of contribution. NRC does not capitalize intangibles, works of art and historical treasures that have cultural, aesthetic or historical value. Assets acquired under capital leases are initially recorded at the present value of the minimum lease payments at the inception of the lease. Capital assets held for sale are recorded at the lower of their carrying value or fair value less cost to sell and no amortization is recorded. Amortization of capital assets is calculated on a straight-line basis over the estimated useful life of the asset as follows:

Asset Class	Amortization Period
Land	Not applicable
Buildings and facilities	25 years
Works and infrastructure	25 years
Machinery, equipment and furniture	10 years
Informatics equipment	5 years
Informatics software	5 years
Vehicles	5 years
Aircraft	10 years
Leasehold improvements	Lesser of the remaining term of the lease or useful life of the improvement
Assets under construction	Once in service, in accordance with asset class
Leased capital assets	In accordance with asset class

Where NRC enters into land leases at a nominal value, the transaction is considered as a non-monetary transaction and is recorded at fair value. Fair value of the transaction is based on market prices. If the estimates of the non-monetary transactions cannot be determined, the amount of the transaction is recorded at a nominal value.

p) Measurement Uncertainty

The preparation of these financial statements in accordance with Treasury Board accounting policies and year-end instructions issued by the Office of the Comptroller General, which are consistent with Canadian generally accepted accounting principles for the public sector requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses reported in the financial statements. At the time of preparation of these statements, management believes the estimates and assumptions to be reasonable. The most significant items where estimates are used are contingent liabilities, environmental liabilities, the liability for employee severance benefits, the allowance for doubtful accounts, the fair value of non-monetary transactions related to leased capital assets and the useful life of capital assets. Actual results could significantly differ from those estimated. Management's estimates are reviewed periodically and, as adjustments become necessary, they are recorded in the financial statements in the year they become known.

q) Asset Retirement Obligations

Liabilities are recognized for statutory, contractual or legal obligations, when incurred, associated with the retirement of tangible capital assets when those obligations result from the acquisition, construction, development or normal operation of the assets. The obligations are measured initially at fair value, determined using present value methodology, and the resulting costs capitalized into the carrying amount of the related asset. In subsequent periods, the liability is adjusted for the accretion of discount and any changes in the amount or timing of the underlying future cash flows. The capitalized asset retirement cost is depreciated on the same basis as the related asset and the discount accretion is included in determining the results of operations.

3. Parliamentary Appropriations

NRC receives most of its funding through annual Parliamentary appropriations. Items recognized in the Statement of Operations and the Statement of Financial Position in one year may be funded through Parliamentary appropriations in prior, current or future years. Accordingly, NRC has different net results of operations for the year on a government funding basis than on an accrual accounting basis. The differences are reconciled in the following tables:

a) Reconciliation of net cost of operations to current year appropriations used

(in thousands of dollars)	**2008**	**2007**
Net Cost of Operations	698,458	676,498
Adjustments for items affecting net cost of operations but not affecting appropriations:		
Revenues	154,530	170,157
Amortization of capital assets	(66,555)	(64,210)
Financial arrangements with other Federal Government departments and agencies	(46,617)	(56,974)
Services received without charge (Note 15)	(25,133)	(27,612)
Specified purpose accounts expenses	(14,009)	(15,131)
Decrease (increase) in salary accrual	5,527	(5,527)
Refunds of previous year's expenditures	3,488	3,540
Decrease in payment-in-lieu of taxes accrual	2,623	371
Increase in employee future benefits	(2,336)	(3,519)
Cost of goods sold	(650)	(745)
Loss on disposal of capital assets	(597)	-
Write-off of inventory	(551)	(870)
Increase in vacation pay and compensatory leave	(359)	(2,805)
Decrease (increase) in litigation claim expense accrual	261	(1,012)
Decrease in environmental liabilities	200	-
Bad debts recovery (expense)	95	(784)
Expenses related to Justice Canada	-	(541)
Other	1,078	2,303
Total items affecting net cost of operations but not affecting appropriations	10,995	(3,359)
Adjustments for items not affecting net cost of operations but affecting appropriations:		
Acquisitions of capital assets and additions to assets under construction	59,824	60,871
Inventory purchases	990	794
Increase in prepaid expenses	884	7,280
Total items not affecting net cost of operations but affecting appropriations	61,698	68,945
Current year appropriations used	771,151	742,084

b) Reconciliation of Parliamentary appropriations provided to current year appropriations used

(in thousands of dollars)	2008	2007
Parliamentary appropriations provided:		
Vote 55 – Operating expenditures	445,422	460,203
Vote 60 – Capital expenditures	47,185	49,943
Vote 65 – Grants and contributions	152,124	145,858
Statutory amounts:		
Revenues pursuant to paragraph 5(1)(e) of the *National Research Council Act*	162,748	133,706
Contributions to employee benefit plans	57,684	54,647
Proceeds from the disposal of surplus Crown assets	656	335
Collection agency fees	48	51
Less:		
Revenues available for use in subsequent years	(66,118)	(78,168)
Lapsed appropriations	(28,598)	(24,491)
Current year appropriations used	771,151	742,084

c) Reconciliation of net cash provided by Government to current year appropriations used

(in thousands of dollars)	2008	2007
Net cash provided by government	673,127	655,005
Adjustments for items not affecting appropriations:		
Revenues	154,530	170,157
Expenditures	(50,074)	(31,978)
Increase in accounts receivable and advances	(484)	(5,791)
Increase in endowment fund investments	(118)	(115)
Decrease in inventory	1,201	1,615
Increase in capital assets	(1,115)	(59,301)
(Decrease) increase in liabilities	(5,916)	12,492
Total items not affecting appropriations	98,024	87,079
Current year appropriations used	771,151	742,084

4. Accounts Receivable and Advances

(in thousands of dollars)	2008	2007
Accounts receivable from external parties	20,869	19,612
Accounts receivable from other Federal Government departments and agencies	5,898	5,846
Employee advances	51	48
	26,818	25,506
Less: allowance for doubtful accounts on external accounts receivable	(1,147)	(2,180)
	25,671	23,326
Repayable contributions	9,944	10,659
Less: allowance for uncollectibility	(8,251)	(7,105)
Net repayable contributions	1,693	3,554
Total	27,364	26,880

5. Equity Investments

Equity investments include shares in publicly and privately held companies. It is not management's intention to hold equity investments over the long-term. NRC will consider timely opportunities for divestiture of equity investments by taking into account the interests, market liquidity and expected future growth of the company. Of all portfolio investments where NRC holds an equity position, six were for debt settlements for a total value of $684,168 (six valued at $644,839 in 2007) and eighteen were obtained by non-monetary transactions (twenty in 2007), of which nine (eight in 2007) are inactive or have filed for bankruptcy. Estimates of the non-monetary transactions cannot be determined, as the value of the financial assistance is highly speculative.

The fair value of the equity investments as at March 31, 2008 was $4,014,877 ($757,292 in 2007).

6. Endowment Fund Investments

This account was established pursuant to paragraph 5(1)(f) of the *National Research Council Act* to record the residue of the estate of the late H.L. Holmes. Up to two thirds of the endowment fund's yearly net income is used to finance the H.L. Holmes award on an annual basis. The award provides the opportunity to post-doctoral students to study at world famous graduate schools or research institutes under outstanding researchers.

(in thousands of dollars)	2008	2007
Restricted cash and investments, beginning of year	4,192	4,077
Net income from endowment	209	208
Awards granted	(91)	(93)
Restricted cash and investments, end of year	4,310	4,192

The portfolio had an average effective return of 4.71% (5.02% in 2007) and an average term to maturity of 5.24 years as at March 31, 2008 (5.07 years as at March 31, 2007). The fair value of the endowment investments as at March 31, 2008 was $4,460,397 ($4,261,721 in 2007).

7. Capital Assets

(in thousands of dollars)

	Cost				Accumulated amortization					
Capital asset class	Opening balance	Acquisitions	Transfers, disposals and write-offs	Closing balance	Opening balance	Amortization	Transfers, disposals and write-offs	Closing balance	2008 Net book value	2007 Net book value
Land	10,972	-	-	10,972	-	-	-	-	10,972	10,972
Buildings and facilities	614,786	7,843	770	623,399	(317,118)	(23,564)	(2)	(340,684)	282,715	297,668
Works and infrastructure	20,185	85	-	20,270	(12,153)	(726)	-	(12,879)	7,391	8,032
Machinery, equipment and furniture	472,547	25,291	(13,822)	484,016	(296,859)	(30,247)	15,546	(311,560)	172,456	175,688
Informatics equipment	68,765	4,301	(4,227)	68,839	(54,518)	(5,021)	4,531	(55,008)	13,831	14,247
Informatics software	17,322	783	(2)	18,103	(6,880)	(3,339)	24	(10,195)	7,908	10,442
Vehicles	2,786	417	(198)	3,005	(2,067)	(247)	186	(2,128)	877	719
Aircraft	10,763	483	-	11,246	(9,074)	(237)	-	(9,311)	1,935	1,689
Leasehold improvements	10,474	742	997	12,213	(1,676)	(450)	(13)	(2,139)	10,074	8,798
Assets under construction	10,562	20,994	(3,815)	27,741	-	-	-	-	27,741	10,562
Leased capital assets	68,100	-	-	68,100	(5,554)	(2,724)	-	(8,278)	59,822	62,546
Total	1,307,262	60,939	(20,297)	1,347,904	(705,899)	(66,555)	20,272	(752,182)	595,722	601,363

Amortization expense for the year ended March 31, 2008 is $66,554,738 ($64,209,615 in 2007).

At March 31, 2008, NRC held eight land lease agreements (eight in 2007) for a nominal annual cost of one dollar with universities. In these instances, NRC owns the building on the leased land. The fair value of the land for these non-monetary transactions cannot be determined.

On March 21, 1996, NRC entered into a non-monetary transaction. NRC entered into a lease agreement with the University of Western Ontario for the relocation of the Integrated Manufacturing Technologies Institute (IMTI) whereby leased property was provided to NRC for twenty-five years at a nominal cost of one dollar. NRC has no obligations to the University of Western Ontario other than the relocation of the institute. The property was recorded as a leased capital asset at its fair value of $10,000,000. The annual amortization of $400,000 for the capital asset is exactly offset by the amortization of the deferred contribution related to the leased property.

On May 23, 2006, NRC took possession of a new facility and entered into a non-monetary transaction with the University of Alberta. NRC entered into a lease agreement with the University for the housing of NRC's National Institute for Nanotechnology (NINT), whereby leased property is provided to NRC at a nominal cost of one dollar per year. The lease provides a one year term with options to renew on ten sequential occasions, each of the first nine renewals to be for a period of five years and the tenth renewal for a period of four years. The building was recorded as a leased capital asset at its fair value of $44,400,000. The annual amortization of $1,776,000 for the capital asset is exactly offset by the amortization of the deferred contribution related to the leased building.

On September 1, 2006, NRC took possession of a new facility and entered into a non-monetary transaction with the University of Prince Edward Island. NRC entered into a lease agreement with the University for the housing of NRC's Institute for Nutrisciences and Health (INH), whereby leased property was provided to NRC at a nominal cost of one dollar per year. The lease provides a nineteen month term with renewal options for seven additional periods of five years, and one additional period of three years and five months (to August 31, 2046). The building was recorded as a leased capital asset at its fair value of $13,700,000. The annual amortization of $548,000 for the capital asset is exactly offset by the amortization of the deferred contribution related to the leased building.

8. Accounts Payable and Accrued Liabilities

(in thousands of dollars)	2008	2007
Suppliers	99,504	102,188
Payable to other Federal Government departments and agencies	14,935	14,017
Accrued salaries, wages and employee benefits	11,423	13,773
Contractor holdbacks	1,849	745
Sales tax payable	66	130
Total	127,777	130,853

9. Deferred Revenue

(in thousands of dollars)	2008	2007
Deferred revenue – contributions related to leased capital assets		
Balance, beginning of year	62,546	6,600
Contributions received	-	58,100
Contributions recognized as revenue	(2,724)	(2,154)
Balance, end of year	59,822	62,546
Deferred revenue - specified purpose accounts		
Balance, beginning of year	13,093	12,596
Funds received	16,877	17,679
Revenue recognized	(15,466)	(17,182)
Balance, end of year	14,504	13,093
Deferred revenue - other		
Balance, beginning of year	9,195	23,598
Funds received	6,724	9,129
Revenue recognized	(8,999)	(23,532)
Balance, end of year	6,920	9,195
Total	81,246	84,834

10. Employee Future Benefits

Employees of NRC are entitled to specific benefits on or after termination or retirement, as provided for under various collective agreements or conditions of employment.

a) Pension benefits

NRC and all eligible employees participate in the Public Service Pension Plan, which is sponsored and administered by the Government of Canada. Pension benefits accrue up to a maximum of 35 years at a rate of two percent per year of pensionable service, times the average of the best five consecutive years of earnings. The benefits are integrated with Canada/Quebec Pension Plans benefits and they are indexed to inflation.

The expense amounts to $42,051,439 ($40,275,048 in 2007) which represents approximately 2.2 times (2.3 times in 2007) the contributions by employees. Both the employees and NRC contribute to the cost of the Plan. As at March 31, 2008, the contributions are as follows:

(in thousands of dollars)	2008	2007
NRC's contributions	42,051	40,275
Employees' contributions	19,250	17,825

NRC's responsibility with regard to the Plan is limited to its contributions. Actuarial surpluses or deficiencies are recognized in the financial statements of the Government of Canada, as the Plan's sponsor.

b) Employee severance benefits

NRC provides severance benefits to its employees based on eligibility, years of service and final salary. These severance benefits are not pre-funded. Benefits will be paid from future appropriations. Information about the severance benefits, measured as at March 31, is as follows:

(in thousands of dollars)	2008	2007
Accrued benefit obligation, beginning of year	58,788	55,269
Expense for the year	7,603	7,180
Benefits paid during the year	(5,267)	(3,661)
Accrued benefit obligation, end of year	61,124	58,788

11. Contingent Liabilities

a) Environmental liabilities

Liabilities are accrued to record the estimated costs related to the management and remediation of contaminated sites where NRC is obligated or likely to be obligated to incur such costs. NRC has identified one site (one site in 2007) where such action is possible and for which a liability of $100,000 ($300,000 in 2007) has been recorded. NRC's ongoing efforts to assess contaminated sites may result in additional environmental liabilities related to newly identified sites, or changes in the assessments or intended use of existing sites. These liabilities will be accrued by NRC in the year in which they become known.

b) Claims and litigation

Claims have been made against NRC in the normal course of operations. Some of these potential liabilities may become actual liabilities when one or more future events occur or fail to occur. To the extent that the future event is likely to occur, and a reasonable estimate of the loss can be made, an estimated liability is accrued and an expense recorded in NRC's financial statements.

As at March 31, 2008, NRC had thirteen claims (thirteen in 2007) outstanding of which two (three in 2007) related to pending charges that will likely result in a liability and two where the outcome is undeterminable (two in 2007). The two claims that will likely result in a liability can be reasonably estimated (three in 2007). A total accrued liability of $1,289,136 ($1,550,000 in 2007) was recorded based on NRC's legal assessment of potential liability.

c) Asset Retirement Obligations

NRC has not recognized any asset retirement obligations in the financial statements. NRC's legal obligations related to asset retirements are subject to several uncertainties and therefore fair values cannot be reasonably determined. Changes in these assumptions and uncertainties could materially affect NRC's assets and liabilities as well as the resulting amortization and accretion expenses related to the asset retirement obligation.

NRC generally incurs the costs associated with the removal and disposal of asbestos and other designated substances located in NRC buildings during major renovations. The timing and scope of renovations which result in the removal of regulated substances cannot be reasonably estimated at this time. Consequently, the asset retirement obligations associated with the removal of asbestos and other designated substances within NRC's premises have not been recognized in the financial statements.

12. Contractual Obligations

The nature of NRC's activities can result in some large multi-year contracts and obligations whereby NRC will be obligated to make future payments when the services/goods are received. Significant contractual obligations that can be reasonably estimated are summarized as follows:

(in thousands of dollars)	2009	2010	2011	2012	2013 and thereafter	Total
Transfer payments	105,827	59,635	10,079	9,900	8,450	193,891
Operating contracts	35,075	9,493	14,579	-	-	59,147
Total	140,902	69,128	24,658	9,900	8,450	253,038

13. Expenses

(in thousands of dollars)	2008	2007
Salaries and employee future benefits	418,453	419,566
Grants and contributions	142,497	142,963
Utilities, materials and supplies	89,331	81,026
Amortization	66,555	64,210
Professional and special services	58,018	60,111
Transportation and communication	28,061	27,127
Repairs and maintenance	18,293	18,180
Payments in lieu of taxes	11,977	13,649
Bad debts	6,390	3,658
Information	4,741	5,377
Rentals	4,214	5,244
Awards	3,153	1,707
Cost of goods sold	650	745
Net loss on disposal of capital assets	597	-
Other	58	3,092
Total	852,988	846,655

14. Revenues

(in thousands of dollars)	2008	2007
Sales of goods and services		
Services of non-regulatory nature and other fees and charges	62,900	64,995
Sales of goods and information products	11,814	11,349
Rights and privileges	9,471	6,663
Lease and use of property	4,303	3,221
	88,488	86,228
Financial arrangements with other Federal Government departments and agencies	46,620	56,974
Revenues from joint project and cost sharing agreements	15,466	17,182
Lease inducement revenue	2,724	2,154
Donations and bequests	621	-
Other	611	573
Gain on sale of equity investment	-	223
Net gain on disposal of capital assets	-	6,823
Total	154,530	170,157

15. Related Party Transactions

NRC is related as a result of common ownership to all Government of Canada departments, agencies, and Crown corporations. NRC enters into transactions with these entities in the normal course of business and on normal trade terms. Refer to Note 4 and Note 8 for receivable and payable to other Federal Government departments and agencies. Also, during the year, NRC received services, which were obtained without charge from other Federal Government departments and agencies. These services without charge have been recognized in NRC's Statement of Operations as follows:

(in thousands of dollars)	2008	2007
Employer's contributions to the health and dental insurance plans provided by Treasury Board	23,706	25,786
Audit services provided by the Office of the Auditor General of Canada	441	500
Legal services provided by Justice Canada	360	635
Workers' compensation benefits provided by Human Resources and Social Development Canada	310	360
Payroll services provided by Public Works and Government Services Canada	167	174
Accommodation provided by Public Works and Government Services Canada	149	157
Total	25,133	27,612

The total of legal services provided by Justice Canada amounts to $1,154,030 ($1,176,429 in 2007). Of this amount, $360,143 ($635,462 in 2007) was provided without charge. The total of accommodation provided by Public Works and Government Services Canada amounts to $321,080 ($322,318 in 2007). Of this amount, $149,298 ($156,876 in 2007) was provided without charge. The total of Workers' compensation benefits provided by Human Resources and Social Development Canada amounts to $834,813 ($690,606 in 2007). Of this amount, $309,838 ($360,188 in 2007) was provided without charge.

16. Financial Instruments

NRC's financial instruments consist of accounts receivable and advances, investments, accounts payable and accrued liabilities, and deferred revenue. Unless otherwise noted, it is management's opinion that NRC is not exposed to significant interest, currency or credit risk arising from these financial instruments. Unless otherwise disclosed in these financial statements, management estimates that the carrying values of the financial instruments approximate their fair value due to their impending maturity.

17. Comparative Information

Comparative figures have been reclassified to conform to the current year's presentation.

Section IV – Other Items of Interest

Organizational Information

NRC Mandate

Under the National Research Council Act, NRC is responsible for:

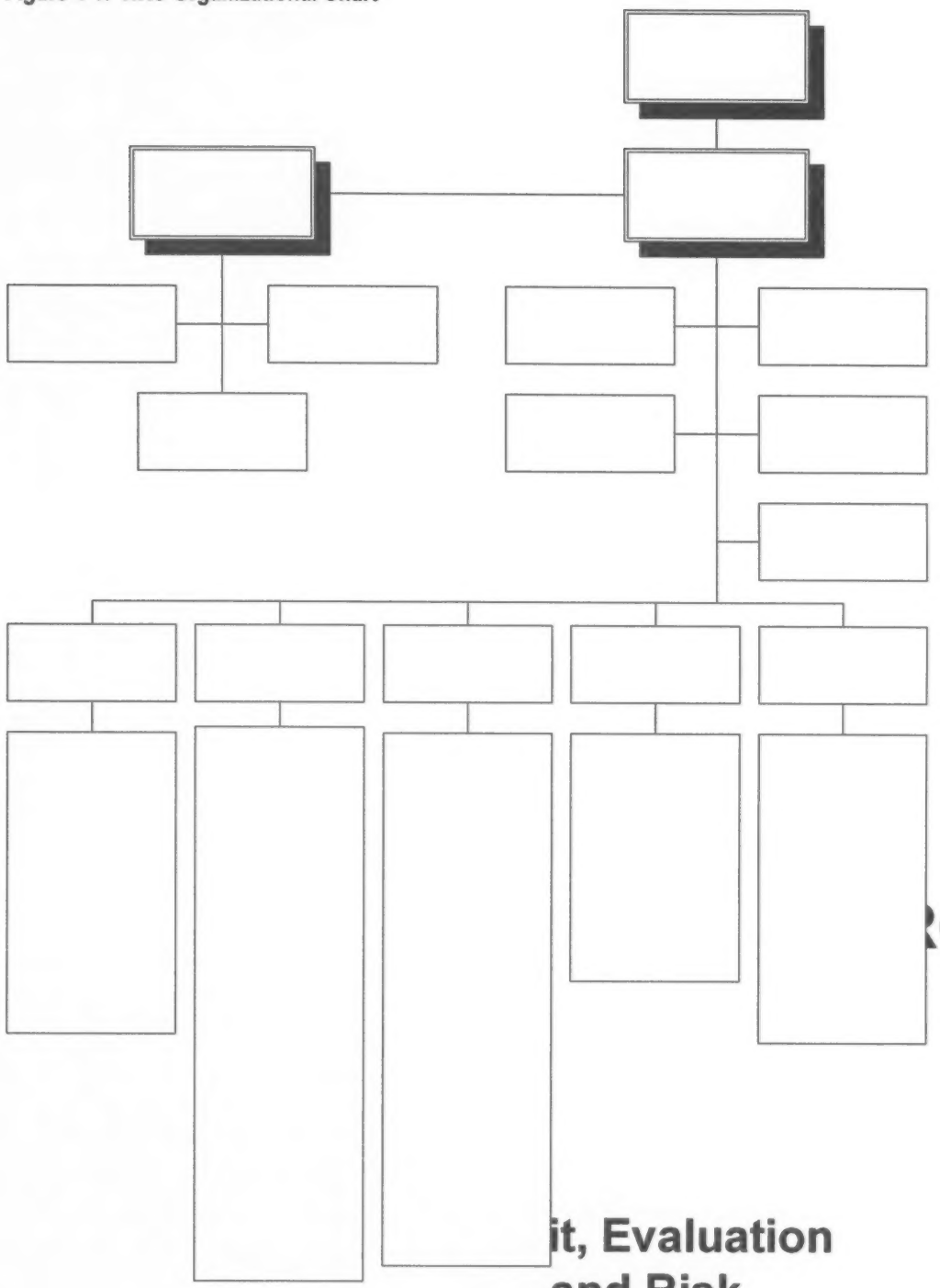
- Undertaking, assisting or promoting scientific and industrial research in different fields of importance to Canada;
- Establishing, operating and maintaining a national science library;
- Publishing and selling or otherwise distributing such scientific and technical information as the Council deems necessary;
- Investigating standards and methods of measurement;
- Working on the standardization and certification of scientific and technical apparatus and instruments and materials used or usable by Canadian industry;
- Operating and administering any astronomical observatories established or maintained by the Government of Canada;
- Administering NRC's research and development activities, including grants and contributions used to support a number of international activities; and
- Providing vital scientific and technological services to the research and industrial communities.

Consult http://laws.justice.gc.ca/en/n-15/87335.html for more details about NRC's legislative framework.

NRC Accountability Framework

NRC reports directly to the Parliament of Canada through the Minister of Industry. NRC works in partnership with the members of the Industry Portfolio to leverage complementary resources and exploit synergies in areas such as innovation of firms through S&T, SMEs and economic growth of Canadian communities. The NRC Council provides strategic direction and advice to the President and reviews organizational performance. The President is the leader, responsible for fulfilling corporate strategies and delivering results. Five Vice Presidents (Life Sciences, Physical Sciences, Engineering, Technology and Industry Support and Corporate Services) are responsible for a portfolio of research institutes, programs and centres. Figure 4-1 provides an overview of NRC's organization.

Figure 4-1: NRC Organizational Chart



Organizational Sustainability

Highly qualified professionals (scientists, engineers, technicians and others) in conjunction with state-of-the-art facilities and equipment are prerequisites to performing at the leading-edge of R&D. NRC faced challenges in sustaining these key resources and continued to focus on strategies to address these challenges.

Implementing NRC's Strategy: *Science at Work for Canada* and advancing the federal S&T Strategy: *Mobilizing Science and Technology to Canada's Advantage*

Corporate business plan – NRC established its corporate business plan in the first quarter of 2007-08. This business plan reflects key commitments and decisions of the NRC Senior Executive Committee and sets organizational direction for three fiscal years (2007-08 to 2009-10). The plan outlines an approach to enhance the financial flexibility of NRC, while ensuring financial and non-financial resources are fully aligned in support of priority NRC programs. It also describes the steps NRC is taking to implement new horizontal R&D initiatives focused on key industrial and social issues for Canada. Heightened collaboration with the private, public and academic sectors is a key theme throughout the document. The corporate business plan will be updated on an annual basis to reflect changing internal and external factors, as well as the ongoing decisions and priorities of both the federal government and the NRC senior executive.

An integrated solution to planning, risk and performance management – In support of the federal S&T Strategy modern approach to management, NRC began the implementation of an integrated management framework in 2007-08 that will continue until April 2010. This framework will provide senior management and NRC Institutes, Branches and Programs (I/B/Ps) with the planning and performance information they need to support integrated decision-making, resource allocation and functional planning (human resources, capital assets and finance). This cross-functional change initiative will include embedding modern management processes and systems that support the integrated management framework. In addition to the integrated corporate business plan, NRC developed a performance measurement framework aligned with its strategy as well as business plans from each of the NRC I/B/Ps. The integrated planning effort supported internal management decision-making and contributed to delivering a fully populated Program Activity Architecture to the Treasury Board Secretariat.

Understanding the impact of federally performed S&T – In 2007-08, NRC actively participated in an inter-departmental initiative led by the Policy Research Initiative (PRI). The initiative is aimed at helping improve understanding of the impact of federally performed S&T and thereby addressing the policy commitment in the federal S&T Strategy to increase accountability to Canadians. NRC has taken the lead on a study examining best practices for measuring S&T impacts as part of this work.

Strategies for sustainable resources – Faced with ongoing resource pressures, NRC is making more strategic choices regarding the use of resources. In 2007-08, this included:

- **Addressing funding issues** – NRC continued to prioritize key R&D and technology and industry support activities, initiatives and programs in the context of the organization's strategy.

It also produced strategies and mechanisms for ongoing reallocation and conducted efficiency improvement reviews to ensure effective investment of resources for sustainability in priority areas. NRC initiated a new organizational resource allocation process in the fourth quarter of 2007-08, requiring all NRC I/B/Ps to develop and submit business plans on an annual basis. To secure funding, these plans must demonstrate alignment with the priorities outlined in both the NRC strategy and the federal S&T Strategy. NRC Senior Executive Committee reviewed all of the I/B/P plans, identified priority initiatives within the plans and funded those initiatives that were deemed essential in order for NRC to execute its strategy, fulfill its mandate and help deliver on the federal S&T Strategy. In 2007-08, initial steps were also taken to identify opportunities for operational efficiencies. For example, NRC initiated audits on organizational-wide facilities and information technology infrastructure and service delivery approaches. The results of these audits, which are scheduled to be completed in 2008-09, are expected to identify potential areas for efficiency gains while highlighting priorities that may require enhanced investments to ensure their long-term sustainability.

- **Talent Management** – NRC continued to move toward the development of an organization-wide Human Resources Management (HRM) strategy, which will be integrated with the corporate business plan. During 2007-08, the Human Resources Branch (HRB) prepared a business plan for 2008-11, which represents the first iteration of an integrated HRM plan for NRC. Throughout 2007-08, NRC continued to focus on previously identified HRM priorities and the development of new HRM strategies to support NRC's future directions. The following are highlights of some of the progress made in 2007-08 with respect to key HRM priorities:

  - *Integrated HR Planning* – The HRB Business Plan 2008-11 incorporated the results of a comprehensive environmental scan which identified HR trends and challenges including an aging population, a decrease in the working-age population, employee generational diversity and increased immigration. The scan also revealed the need to align HRM policies with the NRC goal of becoming more integrated and agile. The environmental scan was supplemented by a review of all I/B/P business plans (approximately 30 plans) to identify common HRM requirements. The HRB business plan incorporated strategies related to governance and accountability, talent attraction and retention and talent management (including recruitment, retention, promotion and development talent critical to the advancement of NRC's overall strategy).

  - *Classification Renewal* – In 2007-08, NRC approved an initiative to bring classification practices in line with NRC's strategy. The NRC Senior Executive Committee approved a plan to renew the classification framework for all positions at NRC. The initiative, as outlined in the HRB Business Plan, will take approximately three years to complete. Four key projects were identified: a renewal of the MG (Management Category) classification standard; a review and update of the RO (Research Officer) and RCO (Research Council Officer) policy and promotion criteria; a renewal of the TO (Technical Officer) standard; and a renewal of all the other classification standards. This initiative promises to improve NRC's ability to attract, retain and reward the talent that the organization has and requires to continue to develop and implement its strategy.

  - *Leadership Development* – In 2007-08, NRC continued to develop and implement its Leadership Enrichment and Development (LEAD) program. A selection process was

undertaken to attract the next round of participants. This process attracted 44 applicants and NRC identified 17 employees for the organization's intensive leadership development program; those who were unsuccessful received feedback on their performance in the selection process as well as access to a multi-source competency assessment and time with a consultant to understand results and formulate a learning plan.

- *HR Performance Management* – In 2007-08, several priorities were identified related to optimizing individual and organizational performance, much of which has been captured in the HRB Business Plan 2008-11. NRC started reviewing its HR performance management processes to ensure consistent application at all levels of the organization. NRC commenced the delivery of performance management training in collaboration with bargaining agents. In May-June 2007, NRC took steps to improve Management Accountability Agreements (MAAs) as part of the performance planning and review process for the Management (MG) category. Approximately 95% of NRC's intact management teams participated in 1-day workshops focused on completing MAAs. Workshops were aimed at linking individual performance agreements to the objectives of the organization and to integrated business planning.

- *Turnover* – Turnover has been relatively consistent for the past three years, with turnover of indeterminate (continuing) staff considerably lower than that of NRC's contingent workforce.

	2007-08	2006-07	2005-06
	(percentage)		
Total Turnover	11.38	11.39	10.75
Total Indeterminate (Continuing) Turnover	4.52	3.36	3.16

(Total turnover includes end of term and short term positions, i.e., was anticipated.)

- *Employment Equity* – At the corporate level, representation levels for all four designated groups improved from 2006-07 to 2007-08. Once again, representation for visible minorities surpassed availability. The difference between representation and availability for persons with disabilities changed from -4 in 2006-07 to +1 in 2007-08. The difference for women improved from -36 to -26 and for aboriginal peoples from -16 to -10.

Designated Group	Representation		Availability*		Difference
	Number	percentage	number	percentage	number
Women	1,552	35.4%	1578	36.0	-26
Aboriginal peoples	47	1.1%	57	1.3%	-10
Persons with disabilities	178	4.1%	177	4.0%	+1
Visible minorities	701	16.0%	637	14.6%	+64
Total workforce	4,378				

*Source: 2001 Census and 2001 Participation and Activity Limitation Survey (PALS)

- *Learning Strategy* – As outlined in the 2007-08 NRC Report on Plans and Priorities, NRC had planned to develop a comprehensive learning plan in 2007-08. However, this activity was deferred in order first to focus on the HRM environmental scan and identification of broader HRM priorities. The need for a comprehensive learning strategy was once again identified at various levels of the business planning process and as such, was incorporated in the HRB Business Plan 2008-11. An organization-wide learning needs analysis was initiated and continues.

- *Collective Agreements* – NRC's Labour Relations (LR) Group continued to negotiate and administer collective agreements on behalf of NRC and maintained ongoing consultations with the two Bargaining Agents representing the majority of NRC employees: the Professional Institute of the Public Service of Canada (PIPSC) and the Research Council Employees' Association (RCEA). Ten collective agreements are administered by the LR group, three of which were negotiated during the 2007-08 period with three having gone before Arbitration Boards for eventual final determination in April of 2008.

- *Official Languages (OL)* – NRC continued with its commitment to its Official Languages Program objectives. The number of NRC executives meeting the linguistic requirements of their positions remained virtually the same year over year, due to the hiring of executives in bilingual non-imperative positions and the successful achievement of other executives in reaching their linguistic goals. The OL Advisor continued to meet personally with each newly hired executive to establish a language-training plan when needed and to secure their commitment to meet OL Program goals. Overall, roughly 89% of NRC employees meet the linguistic requirements of their positions (virtually all of those who have not yet achieved their linguistic requirements are currently in a language training program or have established a training plan). NRC's Consultative Committee on Official Languages' activities continued to be recognized as a best practices leader by a number of federal organizations. Again, in 2007-08, NRC received a number of unsolicited requests to present its OL best practices for organizations such as the Canada Border Service Agency, Justice Canada, and Fisheries and Oceans. NRC also presented to the Pacific Federal Council in Vancouver at its request.

- *Staffing and Recruitment* – During the reporting period, NRC recruited 526 employees bringing the total number of NRC staff to 4,261[9]. Contributing to the federal S&T Strategy People Advantage, over 1,231 students, Post-doctoral Fellows (PDFs) and Research Associates (RAs) worked on research teams at NRC institutes. These individuals had the opportunity to work in a challenging research environment with leading experts in their fields thereby gaining valuable experience and training. In 2007-08, 491 graduate students, 384 summer and co-op students, 151 Natural Sciences and Engineering Research Council Visiting PDFs and 151 RAs worked at NRC.

- *Integrated S & T initiatives* – As an active member of the ADM S&T Integration Board and its related working/task groups, NRC continued to work with other science-based departments and agencies and central agencies to address common management issues having an impact on federal science, this past year. This included participating in

[9] salaried employees, as of 31 March 2008

interdepartmental efforts to address human resource challenges. The Integration Board's efforts are currently concentrated in the following four HR areas: leadership, retention, recruitment and learning and professional development.

- *Ongoing HR Services and Support* – In 2007-08, NRC's HR Client Relations Management Group designed and administered an on-line survey of all internal clients to gauge their level of satisfaction with HR services and support received locally. The completion rate was 48% and the results demonstrated a very high level of satisfaction with the products and the approach of the local HR service providers.

- **Maintaining and upgrading NRC S&T infrastructure** – NRC continues to recapitalize its assets through the appropriation of $5.7 million used to address the most pressing needs of the infrastructure with a focus being applied to health and safety and life cycle management. Some recapitalization projects completed in 2007-08 were:

▪ Replace cooling tower lines (M55, Ottawa) ▪ Building controls upgrade (M55, Ottawa) ▪ Replace air handling units (U70,Ottawa) ▪ Main entrance upgrades (U66, Ottawa) ▪ New chiller (M20, Ottawa) ▪ Switchgear upgrade (U89, Ottawa) ▪ Re-roofing (M50, Ottawa) ▪ Upgrade elevator controls (M58, Ottawa) ▪ T4 &T5 transformer replacement (M-50, Ottawa)	▪ Switch gear upgrade (U70, Ottawa) ▪ Chiller replacement (NRC-IBD, Winnipeg) ▪ Chiller replacement (NRC-IOT, St. John's) ▪ Cooling Tower upgrade (NRC-BRI, Montreal) ▪ Pump upgrades (NRC-IMI, Boucherville) ▪ Sprinkler expansion (NRC-IMB, Halifax) ▪ Roof anchor upgrades (NRC-IMB, Halifax)

- **Developing three-year NRC Communications Outlook** – NRC completed design and began implementation of its strategic communications framework. The framework encompasses internal and external communications, corporate marketing and stakeholder relations components. The new framework positions, profiles and promotes the organization's unique contributions to the federal S&T Strategy. The framework also highlights NRC's own support to industry and its creation of true economic value and social benefits for Canada and all Canadians. In addition to an overarching three-year corporate communications strategy, NRC completed its strategy for internal communications, began development of sub-strategies for the other components of the framework and prepared a business plan for the functions aligned with the NRC Strategy. NRC also began implementation of a new organization structure for its communications function. All of these changes supported implementation of the recommendations from its comprehensive Communications Situation Assessment. In addition, NRC continued its involvement in interdepartmental and government-wide horizontal S&T and innovation initiatives. These included providing content for and input on the design for the Government of Canada S&T web portal.

- **Strengthened Internal Audit Function** – In 2007-08, NRC further strengthened its internal audit function in accordance with the new Treasury Board of Canada Secretariat *Policy on Internal Audit*. The President of NRC approved five internal audit reports upon the

recommendation by the Audit Committee. NRC posted two of the reports on its website (http://www.nrc-cnrc.gc.ca/aboutUs/audit_e.html) in January 2008 and expects to post the remaining three reports shortly. NRC also started six other internal audits and they were in various stages of completion by the end of March 31, 2008. NRC created new audit positions bringing the number from 3.5 to 5 FTEs using the incremental financial resources provided by Treasury Board. Rigorous recruiting efforts resulted in all of these positions being staffed by professionally qualified and experienced staff.

The activities outlined above will help address Management Accountability Framework commitments.

Implementing the Action Plan on recommendations of the Auditor General of Canada – Overall, NRC has made very positive progress in implementing the OAG's recommendations and is actively addressing the recommendations provided in the OAG's February 2007 Status Report. Related accomplishments include:

- Revised role of Council and membership profile;
- Approved Corporate Business Plan;
- Draft Human Resources Branch Business Plan pending SEC approval by March 31, 2008;
- Development of the Management, Resources and Results Management Structure (MRRS) for NRC including key performance indicators and targets; and
- Development of the Balanced Scorecard aligned to the Corporate Business Plan.

Work still requiring progress includes recommendations pertaining to the collection and reporting of performance data and project management. However, significant activity has been taken toward addressing them.

Awards and Achievements

- Atif, M. NRC-IRC
  Selected as Keynote Speaker for two International Conferences on Energy and the Built Environment: CISBAT 2007 (Switzerland) and International Conference on IAQ and Energy-Efficient Ventilation (Japan).
- Beaudoin, J. NRC-IRC
  Certificate for Distinguished Contribution, Academy of Science, Royal Society of Canada
- Brown, B. NRC-CISTI
  Margaret Ridley Charlton Award for Outstanding Achievement, Canadian Health Libraries Association
- Carignan, S., Craig, G., Ellis, K., Gubbels, A., Jennings, S., Swail, C. NRC-IAR
  The Technical Collaboration Program (TTCP) Team Achievement Award, for significant contribution to flight safety and operational effectiveness of all weather rotorcraft operations
- D'Arcy, R. NRC-IBD
  Emerging Professional Award for outstanding contribution in Science & Technology, Discovery Centre, Halifax, NS
- Dean, W. NRC-PBI
  Distinguished Service Award, American Society for Heating, Refrigeration and Air-Conditioning Engineers
- Dimitrievska, S. NRC-IMI
  Prix du meilleur de maitrise, Ecole Polytechnique de Montréal
- Douglas, S. NRC-IMB
  NRC-NSC Eminent Researchers Exchange Program with Taiwan
- Elmahdy, NRC-IRC
  Certificate of Service, Standard Council of Canada
- Hoult, D. NRC-IBD
  Excellence in Technology Transfer Award, Federal Partners in Technology Transfer
- Johnston, A. NRC-IAR
  The Technical Collaboration Program (TTCP) Team Achievement Award, for significant contribution to collaborative research in the area of electron beam curing of polymers and advanced composite materials
- Ko, A. NRC-IBD
  Honorary title of *Associated Researcher* for 2007-08, National Optics Institute
- Lall, S. NRC-IMB
  Best Overseas Indian Fisheries Scientist, Professional Fisheries Graduate Form, Mumbai India
- Mandache, C. NRC-IAR
  The Technical Collaboration Program (TTCP) Team Achievement Award, for assignment on Transient Eddy Current Systems
- Massie, B. NRC-BRI
  Prix de reconnaissance de l'Universite de Montreal, Faculte de medecine

- Proulx, G., NRC-IRC
  Public Service Award of Excellence, Government of Canada, for Excellence in Citizen-Focused Service Delivery in promoting fire safety
- Quilliam, M. NRC-IMB
  Discovery Award (Nova Scotia) – Professional of Distinction
- Smith, I. NRC-IBD
  Distinguished Alumni Award, University of Manitoba Alumni Association
- Whiteway, M. NRC-BRI
  Elected to Fellowship in the American Academy of Microbiology
- Zimcik, D. NRC-IAR
  Canadian Space Agency, Director General's Award, for outstanding contribution during assembly, integration and test of Radarsat-2

How to Reach Us

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Institute for Biodiagnostics – Winnipeg, MB
Director General: Ian Smith
General Inquiries: 204-983-7692 http://www.ibd.nrc-cnrc.gc.ca/

Institute for Biological Sciences – Ottawa, ON
Director General: Jim Richards
General Inquiries: 613-993-5812 http://ibs-isb.nrc-cnrc.gc.ca

Institute for Marine Biosciences– Halifax, NS
Director General: Joan Kean-Howie
General Inquiries: 902-426-8332 http://imb-ibm.nrc-cnrc.gc.ca

Plant Biotechnology Institute– Saskatoon, SK
Director General: Jerome Konecsni
General Inquiries: 306-975-5575 http://pbi-ibp.nrc-cnrc.gc.ca/

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Institute for Chemical Process and Environmental Technology– Ottawa, ON
Director General: Janusz Lusztyk
General Inquiries: 613- 993-4041 http://icpet-itpce.nrc-cnrc.gc.ca

Institute for Information Technology – Ottawa, ON, Gatineau, QC, Fredericton, Moncton and Saint John, NB
Director General: Christian Couturier
General Inquiries: 506-444-6132 http://iit-iti.nrc-cnrc.gc.ca

Institute for Microstructural Sciences – Ottawa, ON
Director General: Marie D'Iorio
General Inquiries: 613-993-4583 http://ims-ism.nrc-cnrc.gc.ca

Institute for National Measurement Standards – Ottawa, ON
Director General: Jim McLaren
General Inquiries: 613-998-7018 http://inms-ienm.nrc-cnrc.gc.ca

National Institute for Nanotechnology – Edmonton, AB
Director General: Nils Petersen
General Inquiries: 780-492-8888 http://nint-innt.nrc-cnrc.gc.ca

Steacie Institute for Molecular Sciences– Ottawa and Chalk River, ON
Director General: Danial Wayner
General Inquiries: 613-991-5419 http://steacie.nrc-cnrc.gc.ca

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General Inquiries: 613-993-5738 http://iar-ira.nrc-cnrc.gc.ca

Institute for Fuel Cell Innovation – Vancouver, BC
Director General: Maja Veljkovic
General Inquiries: 604-221-3099 http://ifci-iipac.nrc-cnrc.gc.ca

Industrial Materials Institute – Boucherville and Saguenay, QC
Director General: Blaise Champagne
General Inquiries: 450-641-5000 http://www.imi.nrc-cnrc.gc.ca

Institute for Ocean Technology – St. John's, NL
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General Inquiries: 709-772-6001 http://iot-ito.nrc-cnrc.gc.ca

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Director General: Bob Bowen
General Inquiries: 613-993-2607 http://irc.nrc-cnrc.gc.ca

Canadian Hydraulics Centre – Ottawa, ON
Executive Director: John Coleman
General Inquiries: 613-993-2417 http://chc.nrc-cnrc.gc.ca

Centre for Surface Transportation Technology – Ottawa, ON
Director: Paul Treboutat
General Inquiries: 613-998-9365 http://cstt-ctts.nrc-cnrc.gc.ca

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Canada Institute for Scientific and Technical Information – Ottawa, ON with offices across Canada
Director General: Pam Bjornson
General Inquiries: 1-800-668-1222 http://cisti-icist.nrc-cnrc.gc.ca

Industrial Research Assistance Program – Ottawa, ON with offices across Canada
Director General: Tony Rahilly
General Inquiries: 1-877-994-4727 http://irap-pari.nrc-cnrc.gc.ca

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Under the Direction of the Vice-President Corporate Services

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